## MACHINERY



POWER TRANSMISSION BEARING

MARLIN-ROCKWELL CORPORATION Executive Offices: JAMESTOWN, N. Y.

## Mere's Mow Meald <u>versatility</u> solved twelve borizing problems at once

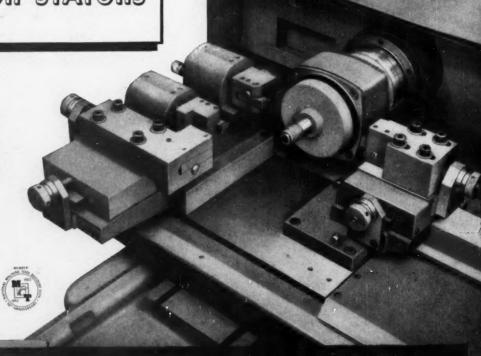
One Single-station
Heald Bore-Matic
permits precision
borizing of

12

DIFFERENT SIZE MOTOR STATORS Where high production is required on a variety of different size parts, the extra versatility of a Heald Bore-Matic pays big dividends in time and effort saved.

Take the Model 321 machine shown below, for example. This boringhead and tool block set-up accommodates 12 different sizes of motor stators, for chamfering, turning and facing rabbet diameters. Interchangeable workholding adapters, adjustable tooling and flexible drive arrangement permit this unusual economy of equipment for such a diversified application. Work is located on stake fixtures from the I.D. of the laminations and against the adjacent face. A chip shield prevents metal particles from getting into the windings.

Remember—when it comes to precision finishing, it pays to come to Heald.



Heald machines speed the nation's production

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago . Cleveland . Dayton . Detroit . Indianapolis . New York

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## MACHINERY

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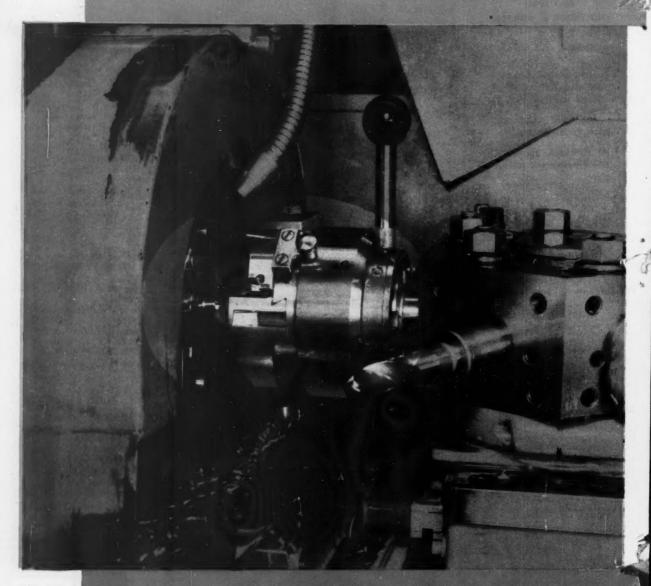


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Data Sheet

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## 1800 Stainless Steel



## LANDIS Machine COMPANY

WAYNESBORO · PENNSYLVANIA · U. S. A.

THE WORLD'S LARGEST, EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT

## Threads Per Chaser Grind

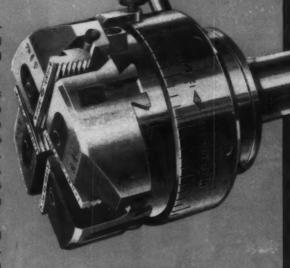
LANDMATIC HEADS are every day saving production dollars for the Crawford Fittings Company of Cleveland by low tool cost and minimum machine downtime.

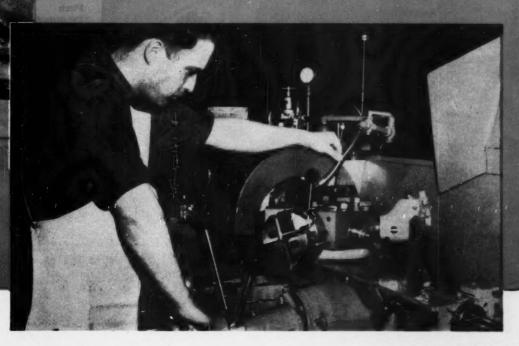
This company manufactures Swagelok Tube Fittings ranging from 16" to 1" in diameter. These fittings are produced from stainless steel tees of austenitic type 316 cold-worked to a Brinell hardness of 250. In producing the 7/16" fitting, for example, (as illustrated) 20-pitch straight UN threads are cut close to the shoulder 5/16" long to Class 3 fit.

LANDMATIC Hardened and Ground Heads, such as used by Crawford, are designed to produce threads to Class 3 or 4

fit in all types of tough materials. Unusually heavy construction and sound fundamental die head design assure the rigidity necessary for accurate threads. The inherent features of the design of the Landis Tangential Chasers and their proper manufacture and hardening, developed during 50 years of threading experience, ensure long chaser life and low threading cost.

If you require threads on stainless steel or other tough material, LANDMATIC Hardened and Ground Heads offer you these same cost-saving features. Please send specifications and write for Bulletin F-80 for additional information.





## Why Blackstone uses

#### **FELLOWS**

Diameter of Gear Number of Teeth Face Width of Blank Pitch Pressure Angle Blank Material Gear Shaper Strokes per rev. of cutter Number of Cuts Taken Feed per Stroke — Finishing Production Rate (Pieces per Hour) Governing Tolerances

WRINGER GEAR

## **Fellows-cut Face Gears**



PERFORMANCE TABLE

IRONER GEAR 2.837

CAST IRON

5/32

16

893

.004

13

.002

1

WRINGER GEAR

C-1010 SH SAE

2.813

3/16 10/12

1620

.002

18

.002

**IRONER PRODUCTS** 

Well made products that give long-time, trouble-free service to the user are sure to gain his continued satisfaction.

Blackstone builds just such products - and by so doing maintains its outstanding reputation for quality in the highly competitive electrical appliance field.

The use of face gears and pinions cut on Fellows Gear Shapers is one of the contributing factors to the success of Blackstone equipment. Production costs are low because these gears are easy and economical to produce and assemble. Quality of product is maintained because they transmit power quietly and efficiently. Long-time, trouble-free service is assured because they provide the smooth running action and the tooth strength needed to reduce the possibilities of breakdown to the minimum.

Contact the nearest Fellows office for details on the way you can take advantage of Fellows experience in furnishing up-to-date solutions to your gear manufacturing problems.

DATA SHEETS describing a simplified procedure for determining the active face width for "on-center" and "off-center" face gears are available.

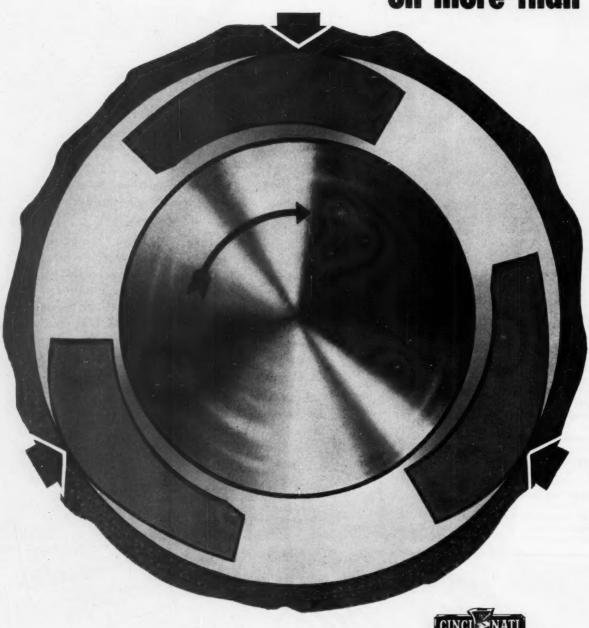


THE FELLOWS GEAR SHAPER COMPANY - Head Office and Export Department : 78 River Street, Springfield, Vermont Branch Offices: 323 Fisher Bldg., Detroit 2 . 5835 West North Ave., Chicago 39 . 2206 Empire State Bldg., New York I





## Not one cent on more than



In this drawing of the FILMATIC principle, the dimensions and clearances are greatly exaggerated. During rotation, high pressure oil wedges support and automatically centralize the spindle—no adjustment required. The spindle drive motor cannot start until the bearing compartment is full of clean, filtered oil. No chance for wear. Write for booklet G-578-1.

CINCIN

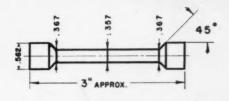
## spent for maintenance 99% of Film SPINDLE BEARINGS

Here's a historical fact that can mean a brighter future for machine shops everywhere. About fifteen years ago cincinnati Grinders were first equipped with FILMATIC grinding wheel spindle bearings. During the intervening years, new model cincinnati Grinding Machines have been introduced, and many improvements have been made in others. However, the feature which has given the greatest benefit—FILMATIC—has been retained. During these long hard years, over 99% of all FILMATIC bearings—thousands of them—never have required time off for any reason whatever. ¶In addition to their dependable perform-

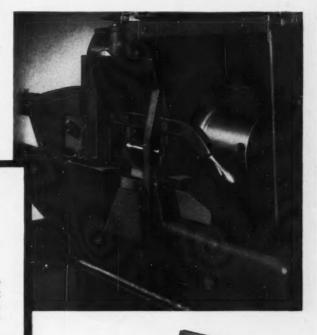
ance, you don't have to pamper FILMATIC bearings. CINCINNATI FILMATIC Grinding Machines take quick roughing or high-quality finish cuts without adjusting the bearings. Spark-out is quicker. No "pecking" of the diamond while truing. ¶FILMATIC'S perpetual youth, found only in cincinnati Grinding Machines, can save time and money in your shop. Specify a cincinnati FILMATIC for your next precision grinder. To obtain brief descriptions, write for general catalog No. M-1712.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

All CINCINNATI Grinding Machines and CINCINNATI Centerless Lapping Machines are equipped with FILMATIC grinding wheel spindle bearings



Imagine trying to remove so much metal—.205" diameter reduction in one cut—without the benefit of FILMATIC grinding wheel spindle bearings. This is a sketch of a tensile test part being ground on the setup at the right, where the grinding wheel has been removed for better visibility.





NATI

Would you like to know more about zero-maintenance FILMATIC spindle bearings? Write for booklet No. G-578-1.

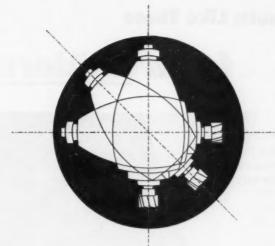


CENTERTYPE GRINDING MACHINES . CENTERLESS GRINDING MACHINES CENTERLESS LAPPING MACHINES.



• Table: 45" x 10"

Cutterhead in angular position



The Adjustable Cutterhead

## BROADENS THE WORK RANGE

of Van Norman Ram-Type Millers

Van Norman Ram-Type Millers mill the original setup at any angle from vertical to horizontal... through the full run of the table... without adjustments and with fewest re-setups.

Here's how it's done — operator simply swings the adjustable cutterhead from one position to the next, slides the ram in or out if need be, and goes ahead with the next cut. This extreme ease of operation and adjustment . . . applicable over an exceptionally wide range of work . . . reduces total completion time per piece, prevents errors, slashes costs. At the same time, quantity and quality of output is sharply speeded up.

And here are some more important features that cut milling costs — directional control of power-feeds . . . 6-way rapid traverse . . . large, easy-to-read dials . . . wide speed and feed selection . . . rugged construction which assures maximum rigidity

Van Norman Ram-Type milling machines will do your work faster, more easily and accurately. Six basic models available to meet every job, ranging from tool-room work to production milling. Write for catalogue.

#### VAN NORMAN COMPANY

SPRINGFIELD, MASSACHUSETTS, U. S. A.

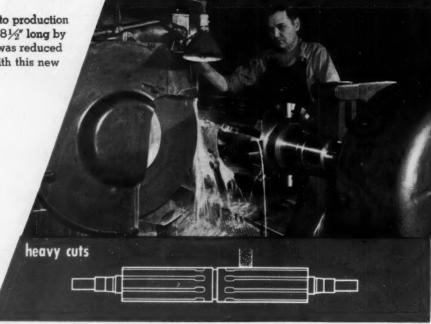


#### You Can Get Results Like These

## from modern Landis



Interrupted cut no obstacle to production of these slotted cylinders 78½" long by 135%" O.D. Grinding time was reduced from 7 hours to 6 hours with this new Landis grinder.



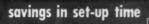


precision grinders

## type FR Roll Grinders . . .

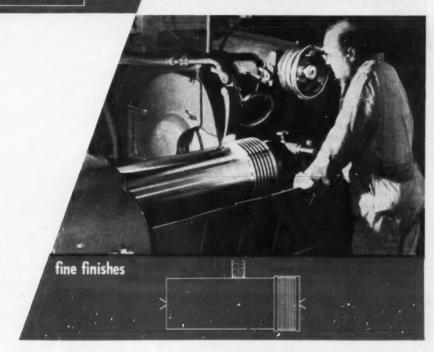
savings in set-up time

Regrinding roll for cold rolling operations. Patented crowning mechanism insures exact duplication of crowning setting on every job. Rolls have 20" face and are 12" O.D. Grinding time is 20 minutes floor-to-floor.

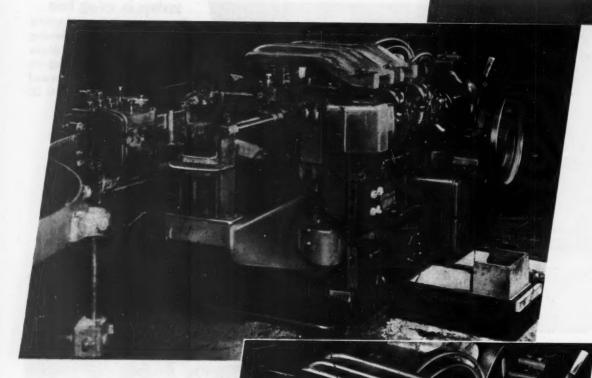


fine finishes

.040" stock removal to 6 micro inch finish are requirements for grinding this 325%" long by 13" O.D. main ram. Floor-to-floor time is 4 hours.



6100



The photograph directly above shows the No. 33 U. S. Multi-Slide Machine as installed in the plant of P. R. Mallory & Co., Inc., Indianapolis, Indiana.

The photograph at the right is a close-up illustrating the use of two die heads or rams at the same time. The use of two die heads or rams at the same time permits staggering the piercing and trim-ming punches, etc., to distribute the load between the rams. This results in increased runs between grinds and also in increased overall tool life.



U.S. TOOL



## Stampings per Hour!

## Electrical Part Requiring 23 Separate Operations Produced Complete on the U.S. Multi-Slide<sup>®</sup>

The photographs on the facing page illustrate an installation of a No. 33 U. S. Multi-Slide Machine® in the plant of P. R. Mallory & Co., Inc., Indianapolis, Indiana, world-famous producers of contact points, powdered metal parts, electrical and radio components.

On this machine they are producing a complicated stamping for the electrical industry which requires the performance of 23 separate operations. These operations are handled simultaneously in the No. 33 U. S. Multi-Slide, and the parts are produced at the rate of 6,100 per hour. This is just one example of the production and cost-saving possibilities of U. S. Multi-Slide Machines.

#### Produce Parts Complete - Reduce Costs - Increase Production

One of the outstanding features of these machines is their ability to produce, complete at each stroke, parts which would ordinarily require secondary operations and handlings if produced on conventional presses. Because formed stampings are produced uniformly and to close tolerances with U. S. Multi-Slides, quality is improved and yet the number of necessary inspections is reduced.

#### Get Greater Versatility

The various movements obtainable on U. S. Multi-Slides are provided by units which are part of the machine equipment, and do not have to be built into the tools. Tools for any one size of U. S. Multi-Slide can be used with any other U. S. Multi-Slide of the same size.

If your production involves piercing, trimming, embossing, swaging, stamping, forming and similar operations, write for a copy of Bulletin 15-M, which gives complete specifications of all four U. S. Multi-Slides.

®Trade Mark Registered—U. S. Patent Office

COMPANY, Inc. AMPERE (East Orange)
NEW JERSEY

U. S. Automatic Press Room equipment—U. S. Die Sets and Accessories

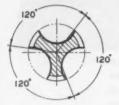
THE TAPS WITH

## BALANCED Lation

Today's WINTER Taps incorporate many mechanical and technical advances in design and manufacture. The result is Balanced Action for better size control and longer tool life.

WINTER BROTHERS COMPANY, Rochester, Mich., U.S.A. Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco: Division of National Twist Drill & Tool Co.

**Exact Flute Spacing** 

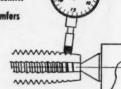


**Uniform Flute Contours** 



**Precision Chip Driver Contours** 









## 

## The National Choice

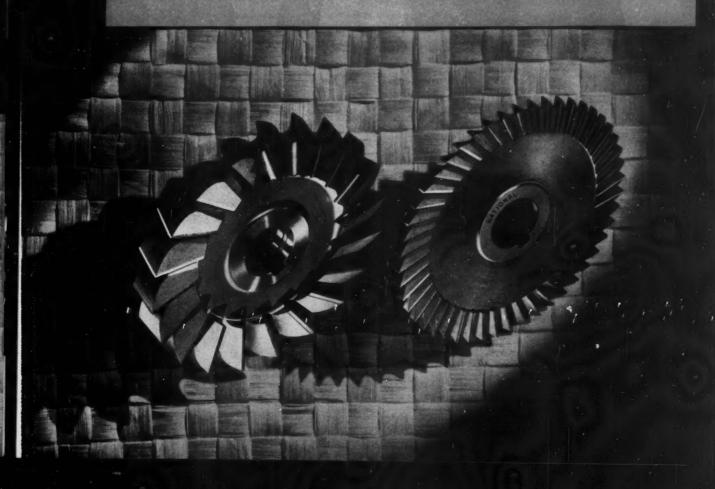
NATIONAL Milling Cutters and Saws like other NATIONAL Tools are the national choice of wise tool buyers. For top operating economy, performance, and dependability insist on NATIONAL.



#### CALL YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

- ... for all your staple industrial needs,
- including NATIONAL Twist Drills,
- Reamers, Counterbores, Milling Cutters, End Mills, Hobs and special tools.

NATIONAL TWIST DRILL & TOOL COMPANY, Rochester, Michigan, U. S. A. Distributors in principal cities. Fectory Branches: New York, Chicago, Cleveland, Detroit, Dollas, San Francisco



# "Standards or



16-MACHINERY, October, 1952

## Specials...

# when it comes to DRILLS-MAKE MINE MORSE every filme!"

Whether it's a run-of-the-mill production job ... or a cranky piece of work in non-ferrous or plastics... production men who know the score, know that Morse Drills score highest on any job ... both in clean-cut, accurate work, and in number of holes per grind.

Then, of course, if you're shooting for extra high score, tell your Morse-Franchised Distributor to give you Morse ELECTROLIZED.

It's good business to keep in touch with your

Morse-Franchised Distributor as a matter of course. He has the complete stock, the seasoned know-how, and the established capacity for service that makes him your standby on any problem involving drills—and any other cutting tool in the complete Morse Line.

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.

(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detrait, Houston, San Francisco

## MORSE

Cutting Tools

...buy them by phone from your Morse-Franchised Distributor and save ordering time

## facts tell the story

# NEW KEARHEVE TRECKER K. USER BIG



## MILLING MACHINE PAYS PRODUCTION DIVIDEND

NEW 25HP CK PLAIN MACHINE OUT PRODUCES PREVIOUS MACHINE NEARLY 4 TO 1!

CK MILLING MACHINE FEATURES THAT HELPED DO THIS JOB BETTER



Greater rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.



CK's 3-bearing spindle and flywheel assure Maximum Cutter Efficiency. On this job it meant fast metal removal and smooth finish in a single pass.



New CK machines have Greater Horsepower. On this job, 25hp enabled operator to get maximum production from his cutters.



No. 60 heavy-duty drive flange around spindle nose permitted use of an extra-rigid heavy-duty arbor on this multiple cutter setup.



0



The new Kearney & Trecker CK milling machine doing this job has 24 different spindle speeds (13 to 1300 rpm.) Its 32 different table feeds range from 3/8" to 90" per minute. Thus operator was able to pick exact speed and feed to get fullest advantage from high horsepower and modern cutting tools. This meant Greater Productivity on this job.



Smoother Feed of CK's large (2" dia.) screw and extra-long table feed nut with backlash eliminator permitted heavy cut.



CK's positive, metered pressure and automatic lubrication assured cool, wear-free operation in spite of heavy cutting load.

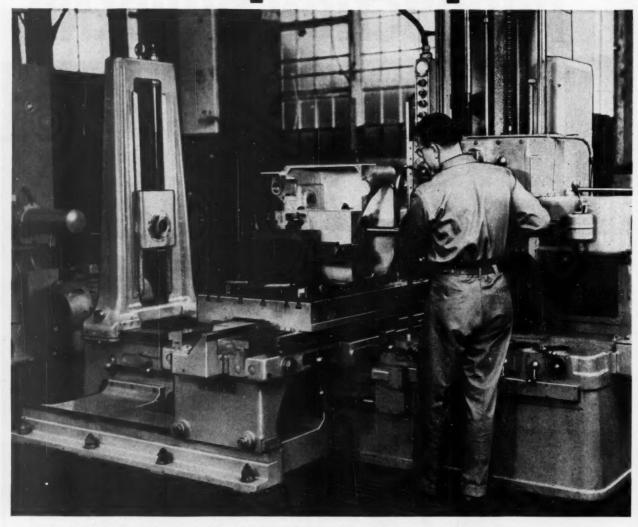


Investigate the new CK line of milling machines. You'll find every feature is test and job-proven to give you cost-cutting results... greater machine capacity, productivity and better finished products. Contact your nearest Kearney & Trecker representative or write: Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

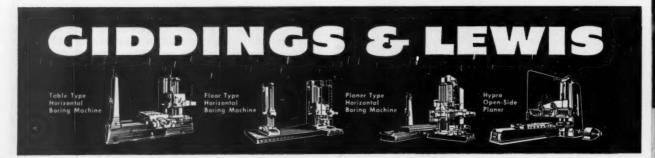
New No. 4 Model CK 25hp Plain



## Now, 45 Spindle Speeds.



G&L Model C — 300-T equipped with an automatic electric positioning device completes 47 distinct operations — including boring, drilling and milling, as well as counterboring and reaming on this complex gear case housing in less than three hours.



## from 7 to 1600 rpm...The precision plus G&L Model 300-T Horizontal Boring, Drilling and Milling Machines

THE most modern design on the market today — G&L 300-T machines precision bore, drill and mill with EQUAL efficiency. Headstock, table and saddle operate independently — up or down, right or left, forward or reverse — at separate, adjustable feeds.

EXCLUSIVE — 45 reversing spindle speeds. Any speed from 7 to 1600 rpm is easily obtainable by merely adjusting a simple selector lever. This extra wide range of work speeds — plus 23 distinct milling feeds — allows optimum use of modern cutting tools . . . provides exceptionally fine milling or boring operatings.

Available in two models: Model B, with G&L's compact, extra rigid, and "easy-to-

work-around" table and saddle . . . and Model C, which has over-the-floor-saddle supports and a larger work table for ultraprecision work.

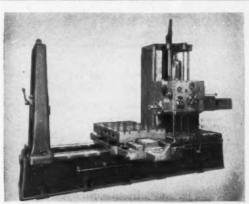
#### **Eliminate Pre-Layout**

Both models put precision operations for job lot quantities on a virtual production basis. What's more, Model C is available with an Automatic Electric Positioning Device. This ends the necessity for manual adjustments for table and headstock settings on a wide variety of applications . . . and does it AUTOMATICALLY . . . WITH SETTINGS ACCURATE TO TENTHS OF THOUSANDS OF AN INCH!

Write today for the new G&L catalog on 300-T models. Don't hesitate — DELIVERY MAY BE BETTER THAN YOU THINK!

#### Check these features of Model 300-T

- Easy, accurate setting of .001".
- 3" diameter spindle with speeds from 7 to 1600 rpm. Extra-low spindle speeds are possible because of special 3-to-1 reduction gears.
- 23 distinct milling feeds.
- Extreme rigidity of all components.
- 10 hp, 220/440 volt, 3 phase 60 cycle dynamically balanced AC motor equipped with a electromagnetic brake for positive control at all times.
- Centralized directional controls.
- · Automatic electric safety devices.
- Force feed lubrication.
- Noiseless operation.



G&L - 300-T Model B Machine.





Torrington Needle Bearings are "naturals" for fast assembly line operations. Here's why:

They are complete, compact units, ready for instant installation.

No time is wasted producing complex housings a straight bore, machined to size, is all that's needed.

A simple arbor press operation seats Needle Bearings by press fit—no spacers or retainers are required.

The high radial load capacity, compact size, light weight and other advantages of Needle Bearings help improve product efficiency. Why not get the whole story from your Torrington engineer today?

THE TORRINGTON COMPANY
Torrington, Conn. South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada



TORRINGTON NEEDLE BEARINGS

Needle . Spherical Roller . Tapered Roller . Straight Roller . Ball . Needle Rollers

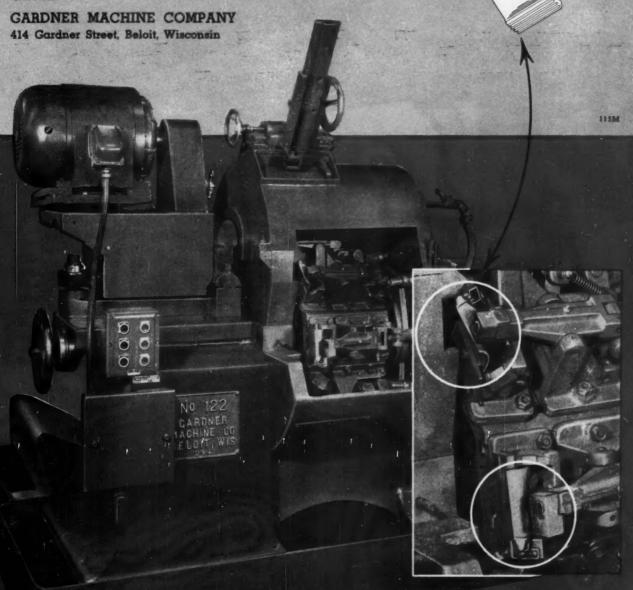
## Grind 360 Non-Parallel Edges of Jet Turbine Buckets per hour

# GARDNER Grinders

#### Gardner method solves production problems

A Gardner No. 122-23" semi-automatic disc grinder gives this production by use of a rotary work carrier. Alternate fixtures permit grinding the two non-parallel edges. Each piece passes through the machine twice. Stock removal is 1/6" per surface.

For help on your flat surfacing problems consult Gardner.





Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength. Each is beautiful in finish and line, is a quality tool to be proudly possessed by any mechanic—or certain to "give a lift" to any assembly line. Buy wrenches which carry the trade marks HI-TEN or ARMALOY. On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality.

WRITE FOR CATALOG

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"
5213 W. ARMSTRONG AVENUE CHICAGO 30, ILL

## VOTE FOR CIMCOOL

#### for 85% of all metal cutting jobs!

And it's a landslide for Cimcool owhen these facts also go on the record: this radically new and different cutting fluid lowers costs... permits faster speeds...increases accuracy... and helps increase tool life.

Cimcool wins a sweeping victory over old-fashioned coolants because it's a chemical emulsion. It replaces all water emulsions and all but a few highly compounded specialty oils. Cimcool permits faster speeds and increases tool life because it combines friction reduction and cooling capacity in a degree never before attained. It's longer lasting in machines. So Cimcool reduces downtime and cuts labor costs for cleaning and changing.

We know you'll give Cimcool a vote of confidence after a demonstration in one of your own machines. For that demonstration, just write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "CIMCOOL Defeats Heat". Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

\*Trade Mark Reg. U.S. Pat. Off.

A Production-Proved

Product of

THE CINCINNATI MILLING

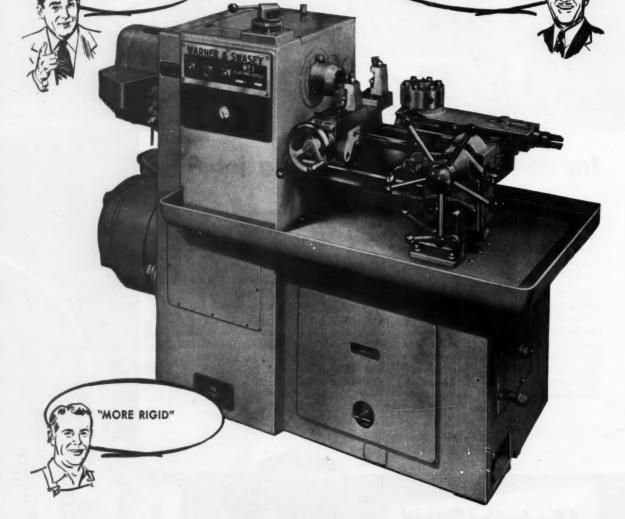
MACHINE CO.

OF ALL METAL CUTTING JOBS

# E WARNER &

"MORE EFFICIENT ON STAINLESS STEEL"

"A GREAT DEAL MORE FLEXIBLE THAN PREVIOUS MACHINES OF ITS SIZE"



YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER

## SWASEY TURRET LATHE

## wins fast acceptance!



"DELIGHTED WITH ITS ACCURACY AND SPEED RANGE"



Swasey No. 1 E-C has lived up to the reputation for accuracy and dependability already set by its "big brothers" in the Warner & Swasey line.

Reports keep coming in from such leading metalworking plants as Dumore Company of Racine, Allmetal Screw Products of New York City, Bahnson Company of Winston-Salem, Wisconsin Motor Corp. of Milwaukee and Kearfott Manufacturing of Newark.

And many others tell us the 1 E-C is outperforming any small capacity turret lathe they've ever had in their plants! You too, will find it profitable to investigate the Warner & Swasey No. 1 E-C Turret Lathe, by having your Warner & Swasey Field Engineer show you how it can improve your small diameter bar operations.







& SWASEY TURRET LATHES, AUTOMATICS, AND TAPPING MACHINES

# Research by world's leader in machine tools led to entirely new concept in CINCINNATI Grinding Wheels

THROUGH 25 years of research in chip formation, it has become increasingly apparent to Cincinnati Milling that the grinding process is a true metal cutting process. Research has proved that the grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting process. Cincinnati Grinding Wheels stem

DIAPHRACM PRIVOT

TARGET

BRINELL MICROSCOPE

DIAGRAM of optical instrument which

RESEARCH SCIENTIST shown above is using optical instrument to check tiny deflections resulting from grinding forces.

DIAGRAM of optical instrument which was developed by research laboratory of the Cincinnati Milling Machine Co.

from a frank recognition of these basic facts.

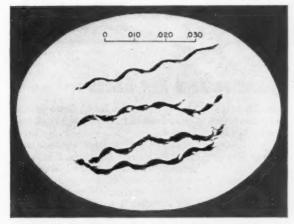
This new concept is the beginning of a whole new approach to grinding wheels—the development of the grinding wheel as a true cutting tool. And it is a development you might expect from Cincinnati Milling, with the world's largest background of research in metal cutting.

For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

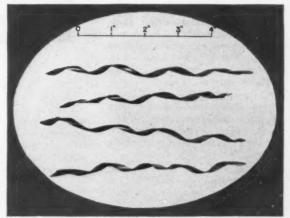
Furthermore, available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, just write, wire or phone us.



RESEARCH GRINDING problems have ranged from the grinding of surgical sutures .004" in diameter to steel mill rolls 60" in diameter.



CONTINUOUS GRINDING CHIP obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible under good grinding conditions.



CONTINUOUS MILLING CHIP obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips shown in the photomicrograph to the left.

FREE BOOKLET Coming off the presses now is a brand new booklet, "A New Concept In Grinding Wheels." It contains many remarkable microphotographs, as well as a complete picture story of how Cincinnati Grinding Wheels are made. A copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.





## LINDE'S News of Metalworking

### Sigma Welding...

#### A Process with Outstanding Promise

Recently, the country's biggest tank car manufacturer received the largest order for aluminum tank cars ever issued — ninety-eight tank cars on a single order. This order was obtained only because of the development of a fully automatic welding process . . . shielded inert gas metal arc welding — sigma welding.

This welding process has made double-vee butt welds at 5 in. per min. in 1-in. material. Structural welds have been made at 48 in. per min. in ¼ in. plate, and as high as 200 in. per min. on ½ in. material.

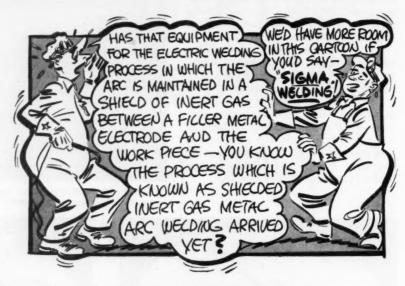
Prior to the development of sigma welding, fabricating aluminum tank cars was a slow hand process. In order to weld the heavy plates used in making the cars, as many as six passes were required.

With an automatic sigma welding setup, X-ray quality welds in the ½ to 1½ in. thick aluminum plates are made at speeds of from 6 to 15 in. per minute. And only 2 passes, one inside and one outside, are required to get perfect penetration. High current densities used in sigma welding result in narrow welds with deep penetration.

Sigma welding is fast becoming an important fusion welding method. It has not only replaced many other welding methods, but has permitted fabrications hitherto impracticable for welding.

Just recently, a metalworker adopted this process for welding an aluminum-bronze valve seat to a mild steel tube . . . sigma welding proved to be the only practical method he could use for this work.

Another shop built their first aluminum tank using sigma welding... The large tank was finished so quickly—work progressed without stopping—that the shop will replace all other welding methods with sigma welding. Excellent welds requiring little finishing were obtained in the ½ in. aluminum plates.



#### **New Processes Need New Names**

The cartoon shows just about the way it started . . . Shielded inert gas metal arc welding was quite a mouthful to say when describing or referring to the process. It also required a lot of space in written material.

Then someone said sigma welding. It was easier to say.

Sigma is a good word, too. Each of

the letters is an initial letter of the words: shielded, inert, gas, metal, and arc.

This easy-to-say word, sigma, is now used to describe the process. It is not a trade-marked word, and is used in the same sense as oxy-acetylene welding, gas cutting, or brown dog — just like any other descriptive adjective.

#### Metals Being Joined by Sigma Welding

Sigma welding can be used on practically all commercial metals. Railroad tank cars, chemical and food processing tanks, pressure vessels, and brewery equipment are only a few applications where the process is being used economically. Here's a quick look at some of the metals being joined by this process:

Aluminum . . . All weldable grades including 3-S, 50-S (150-S), 52-S, 61-S, and the commercially pure 2-S alloy are being welded with excellent results . . . These alloys are being machine welded in thicknesses ranging from 0.50 in. to 1.50 inch . . . Hand welds are made in material ½ in. and thicker . . . Maximum thickness that can be welded is unlimited with multi-pass technique . . .

Stainless Steel . . . Sound X-ray quality butt welds have been obtained in thicknesses ranging from % to % inch . . . Quite evident that heavier thicknesses can be welded . . . Results of tests show that welds possess good tensile strength, elongation, and impact resistance . . .

Copper... Sound butt, fillet, and corner welds have been made in % in. and % in. deoxidized copper.

Everdur... Butt welds made in %, %, and ½ in. thick materials are sound, smooth, and without cracks or undercutting. Tests showed that bend and tensile specimens have excellent properties.

Carbon Steel... Sound machine butt welds have been made in ½ in., ¼ in., and ½ in. thick killed and semi-killed carbon steels...

Aluminum Bronze rod has been deposited on mild steel with excellent results . . . Wear resistance greatly improved . . . Other surfacing and buildup operations very successful . . .

## LINDE'S Apparatus for Sigma Welding

Here is Linde's sigma apparatus for either machine or hand-welding. It provides automatic operation, accurate and uniform control of rate of rod feed, easy handling, and simplicity of operation . . . Everything to help you make X ray quality welds at high speeds.

#### Hand Torch Designed for Easy Handling



The Linde HW-11 Torch is designed for sigma hand-welding. It is lightweight, and pistol-shaped to provide a convenient grip and easy handling. The gas cup and torch power cable are water-cooled for protection from overheating. All hoses to the torch are bound together in a synthetic rubber sheath which is highly flexible.

The rated capacity of the torch is 400 amp. when cooling water flow is 1 qt. per min. at inlet temp. of 60 deg. Fahrenheit.

#### Simple Assembly Controls Rod Feed



LINDE'S Rod Feed and Control Assembly for hand-welding, automatically controls rod feed at all times. Rod is fed at a constant predetermined speed which is regulated by an electronic governor. Rate of rod feed depends on the current and material being welded, and can be easily ad-

justed by a potentiometer. A rough initial setting for the potentiometer is determined from welding data tables. After the arc is struck, the operator can adjust the potentiometer, if necessary, to get a steady, smooth arc. Welding is then done without any further adjustments.

#### Argon Regulator Assures Uniform Gas Flow

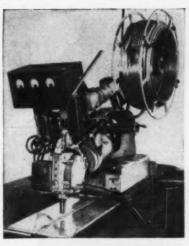


The Oxweld R-502 Regulator, designed specifically for inert gas welding, reduces the pressure of the argon stored in the cylinder to the working pressure needed. One simple setting adjusts it to supply the torch with the correct rate of argon flow required for the work at hand. A built-in flowmeter and throttle valve always show the flow of argon used. The indication is always true, and is not affected by the pressure drop between the valve and the working end of the torch.

## Machine Welds Made at High-Speed with the FSM-1

LINDE'S FSM-1 machine makes clean, smooth welds. Welding is fast and weld quality high. Almost any metal thickness can be welded by a suitable number of passes.

The FSM-1 is recommended for welding long seams, or for work that is fairly repetitive. The welding head can be positioned for practically any work requirement. It has provisions for vertical and lateral adjustments in two



planes for the angle at which the welding rod is fed into the weld zone. Retract starting provides for starting the arc quickly and conveniently.

## LINDE Argon (99.92% pure), and Sigma Grade



For welding stainless and carbon steels, Linde argon — sigma grade, a mixture of oxygen in argon, speeds metal deposition. It permits welding at high speeds without undercutting, improves coalescence of the weld metal, and makes overhead welding of stainless steel practicable.

For those metals requiring a pure argon gas, Linde offers standard welding argon that is 99.92 per cent pure. This high purity makes it the best allaround shielding gas.

For further information about LINDE's equipment for sigma welding, please contact any LINDE office.

The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

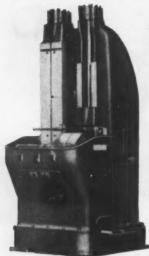
#### LINDE AIR PRODUCTS COMPANY

A DIVISION OF UNION CARBIDI AND CARBON CORPORATION

30 East 42nd Street TT New York 17, N. Y.
Offices in Other Principal Cities

In Canada: Deminion Oxygen Campany, Limited, Tarante

MACHINERY, October, 1952-31



**Duplex Surface Broaching Machine.** Made in 5, 10, 15 and 25 Ton Sizes.

## for increased production

latest surface broaching methods on cast iron parts, teeth serrations and slots



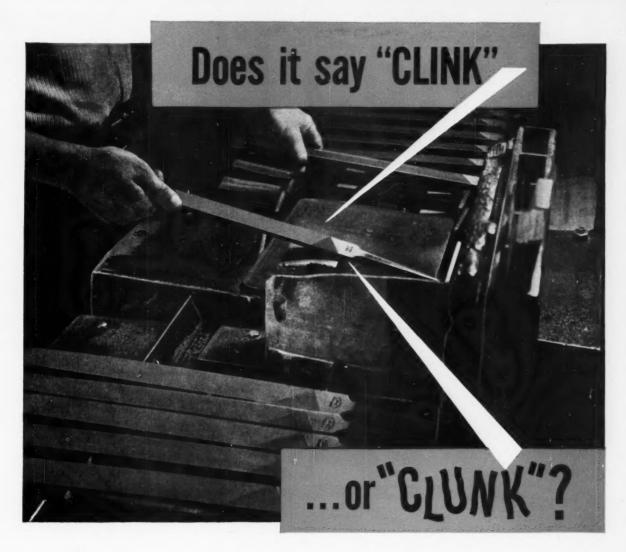
Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

Whether the material is steel or cast iron, parts are being successfully surface broached on Footburt machines. Broaches used on Footburt Surface Broaching Machines have a patented tooth that is especially advantageous on heavy cuts. We will be glad to work with you on your machining problems and make recommendations based on our many years experience in surface broaching.

THE FOOTE-BURT COMPANY, Cleveland 8, Ohio . Detroit Office: General Motors Building



surface broaching for difficult machine work



ONE of the proofs of a file's basic soundness is its clear ring — "clink" — when you tap it lightly on an anvil or other hard piece of metal. A dull "clunk" is usually a sign of "water cracks" or poor hardening.

Nicholson employs a score of checks and tests in connection with steel examination, forging, blank smoothing, annealing, cutting, hardening and other operations in the manufacture of files. The "ringing" test is one of many that lead to the final "okay" under the Nicholson policy of Twelve perfect files in every dozen.

This company really "leans over backwards" to put into Nicholson and Black Diamond files longer sharpness, better performance, greater value than are combined in any other commonly known brand. That's why it pays to specify them . . . and why industrial distributors are proud to recommend them.

#### BUY THROUGH YOUR INDUSTRIAL DISTRIBUTOR

FREE BOOK, "FILE FILOSOPHY" - 48 interesting illustrated pages on kinds, use and care of files. Indispensable to production heads, purchasing agents, shop foremen. How many copies shall we send you?



NICHOLSON FILE CO. . 18 ACORN STREET . PROVIDENCE 1, RHODE ISLAND

(In Canada, Port Hope, Ont.)

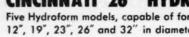


NICHOLSON FILES FOR EVERY PURPOSE

# Hydroforming

Here, One draw does it





Five Hydroform models, capable of forming blanks 12", 19", 23", 26" and 32" in diameter are available. Information on machines of larger capacity furnished on request.



One "hug" of the Cincinnati Hydroform produced the finished shape shown in the photo at left. The part, drawn to a depth of 8½" from a 25" dia. blank of .062" aluminum, formerly required five operations to produce.

Hydroforming makes possible the deep drawing of intricate shapes in far fewer operations than conventional practices allow. Many examples are on record where two, three—often more—operations have been saved. Most parts can be Hydroformed in a single draw. But where the shape of the part requires more than one operation, two or more blanks can be stacked and preformed in one stroke. The Hydroform can be tooled to trim, pierce and

form light gauge metals in the same operation.

The savings of operations by Hydroforming is but one major advantage. The simple tooling required reduces tool costs up to 90%. Practically any shape, from a wide variety of materials up to 3/8" thickness, can be Hydroformed. Part quality is materially improved. Springback, thin-out and spot stresses are greatly reduced or eliminated. Surface finish of the material is unimpaired.

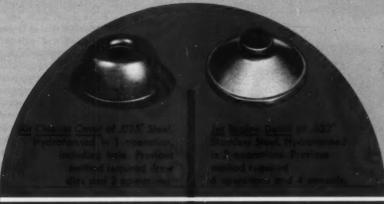
Investigate Hydroforming now. It will change your thinking on deep drawing and forming. Consult your nearest Cincinnati Milling Machine Co. representative for detailed information on this revolutionary metal forming process.



#### WRITE FOR NEW HYDROFORM BULLETIN

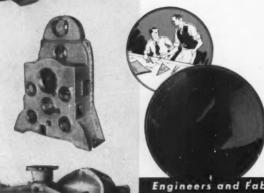
For a complete description of Hydroforming—tooling details, operation, examples of Hydroformed parts, machine dimensions, and general specifications—write for your free copy of Bulletin M-1759.











Illustrated above are parts of a pneumatic pipeline conveying system. Each unit embodies an Air Operated Swing Check Valve and Lower Pressure Chamber. These completely machined and assembled units, together with those at the left, are presented as further evidence of the versatility of the Mahon organization in producing and machining Steel-Weld Fabricated parts and assemblies for hundreds of manufacturers throughout the country. If you have parts or assemblies in your product that could be redesigned and produced to better advantage from a strength—weight—bulk standpoint, or, if you are faced with a limited production on an item involving heavy pieces in which pattern costs are a consideration, you can turn to Mahon with confidence. You will find in the Mahon organization a unique source with complete, modern fabricating, machining and handling equipment to cope with any type of work regardless of size or weight . . . a source where skillful designing and advanced fabricating technique are supplemented by craftsmanship which assures you a smoother, finer appearing job, embodying every advantage of Steel-Weld Fabrication.

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

# Production Pointers from

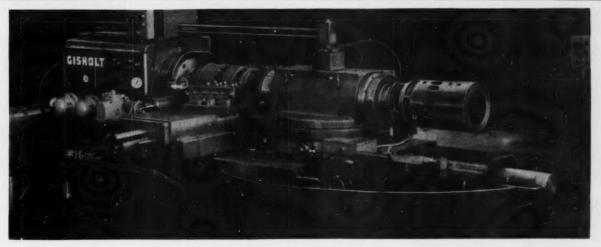


SAVING IDEAS



# GISHOLT

Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.



No. 24 Hydraulic Automatic Lathe with special turret having two mandrels.

#### **PIVOTING MANDRELS END LOADING TIME LOSS**

## No. 24 Hydraulic Machines One Part While Another Is Loaded

In this interesting production pointer, loading time is actually part of machining time—with one workpiece being put on the lathe or taken off while another is being machined.

The part is a diesel engine castiron cylinder liner and the machine is a No. 24 Hydraulic Automatic Lathe which has two identical expanding mandrels on an indexing carriage. Twin arbors are mounted 180° apart with ratchet teeth for driving.

#### **Single Automatic Operation**

The automatic cycle begins with carriage moving forward until the arbor engages driving teeth in the spindle nose. This brings in the front and rear slides carrying a total of 28 tools which machine all outside diameters, faces and chamfers. With cuts completed, the tool slides retract, the

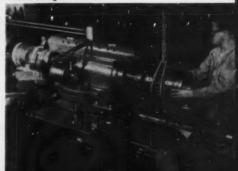
work carriage traverses back and automatically indexes the new workpiece into position.

This feature achieves important savings in time and added production. With a finished liner being unloaded and new workpiece put in place during machining, loading and unloading time are absorbed in the machining cycle. Hence, the machine spends most of its time making chips. The only lapsed time between machining is for traversing up, back and for indexing-less than half a minute! Machining time for this linerand other sizes handled on other No. 24 Hydraulics-is below 3 minutes . good reason why this manufacturer standardizes on the efficiency of the No. 24 Hydraulic Automatic Lathe for these operations.

With Twin Mandrels This No. 24 Hydraulic Provides Continuous, Fast Production with No Lost Loading Time.



Operator loads new workpiece while another liner is being machined.





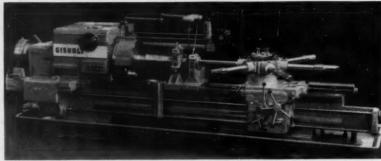
## HOW THIS DIFFICULT BORING JOB BECAME AN EASY ONE ... MORE ACCURATE, TOO

#### Saddle Type Turret Lathe Is the Answer

Here's the kind of job that qualifies as a tough one, any day. Yet see how this turret lathe takes it in stride. The part is an alloy steel propeller shaft measuring 36½"—with various inside diameters to be machined.

A standard 2L Saddle Type Turret Lathe is "tailored" for the assignment: In place of the side carriage there is a quick-clamping steadyrest and boring bar support. For safety and convenience, the handwheel for the Hydraulic Speed Selector and the emergency push-buttons are duplicated at the working position.

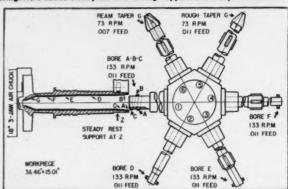
As shown in the layout, seven different internal surfaces are handled. One of these is the taper bore which is rough and finish reamed. Coolant flows through the boring bars directly on the tool bits. Floor-to-floor time with this well planned setup is 30.5 minutes with a high degree of accuracy, proving again that tough jobs can be easy ones on a Gisholt Saddle Type Turret Lathe.



Good setup for deep boring. Note added steadyrest and boring support. Also duplicate controls.

for boring propeller shafts.

This Saddle Type Lathe Completes All These Difficult Interior Surfaces in One Chucking.



#### "UTILIZING EVERYTHING BUT THE SQUEAL"

#### Hard Working Ram Type Lathe Setup for Clutch Parts

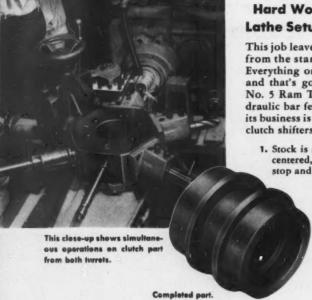
This job leaves nothing to be desired from the standpoint of efficiency. Everything on the lathe is busy... and that's good! The machine is a No. 5 Ram Type with standard hydraulic bar feed and collet chuck and its business is producing 2½" sliding clutch shifters. Here's how it does it:

- Stock is moved out to length and centered, using combination stock stop and starting drill.
  - 2. Counter-bore and small bore are drilled from the hexagon turret while both hubs are turned from square turret.
  - 3. Center recess is formed from square turret and the end is then faced from rear tool post.

- Grinding relief is turned (both sides of center recess) from square turret.
- Small ID is finish bored and reamed from hexagon turret.
- Counterbore is finished from hexagon turret and cut off from square turret.

Floor to floor time is 7 minutes—with every minute of the way made easy for the operator by these Gisholt features which provide: 1. Shifts to new spindle speeds by a simple twist of the Hydraulic Speed Selector. 2. Proper spindle speed for reaming the small ID by merely tapping the Hi-Lo lever. And, 3, ease of changing feed by setting a single dial-type lever.

A Splendid Example of Well Planned Tooling and Simultaneous Machining from Both Turrets — Gives Maximum Efficiency to This Ram Type Turret Lathe Job.



A ONE-MAN, TWO-MACHINE TEAM

Gear Blank Savings Are "Automatic"

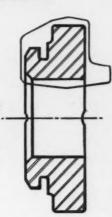
It's a case of perfect teamwork ... the way these two 2F Fastermatic Automatic Turret Lathes turn out gear blanks. Splitting the job accounts for important savings in time, money.

First machine: With the steel forging held on the chucking hub, three passes are taken through the bore and two passes across the face, then rough turn and chamfer—all handled from the turret. Rough and finish grooving is done by tools on the independent front and rear cross slides. Time: 5 minutes.

Second machine: Part is held in the bore while turret tools remove chucking hub, semi-finish and finish the various diameters and chamfer. The two cross slides complete the rough and finish facing. Time: 3 min.

Not only is gear blank production made fast by this two-machine setup, but it's planned for real economy with one operator tending both lathes. Moreover, with the chance for human error eliminated by the automatic operation of the Fastermatics, there's assured accuracy with true concentrics and parallels.

For gear blank work—or any kind that belongs on an automatic turret lathe, investigate the Fastermatic.



Operations required to finish gear blanks. Light line indicates rough forging.

On This Gear Blank Job, Operator Is Needed Only for Loading and Unloading—the Two Fastermatics Automatically Perform All Work.





First operations on gear blanks are performed by this Fastermatic.

#### PUTS FINISHING TOUCHES TO CRANKSHAFTS - BUT FAST

#### Simplimatic Does Neat Job on Counterweights

Crankshafts always make interesting machining jobs. On this one, for a V-8 engine, a Simplimatic Automatic Lathe takes care of the six counterweights. Here's the setup:

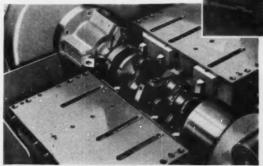
The 25½" crankshaft is held in a special pot-type chuck and driven from a slot in the flange. The oil seal bearing surface rests in a half bearing and is clamped with two jaws. There's a steadyrest at number three main bearing for support. Number one main bearing is held in a tapered, slip-fit bushing in the tailstock.

Three tools each in both the front and rear slides turn all six counterweights and generate chamfers 1/8" by 45 degrees. Floor to floor time is 1.66 minutes, using H. S. S. cutting tools. The sliding tool holders, a precautionary feature for this job, retract into master blocks after cycle is completed, thereby providing loading clearance and tool protection.

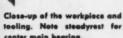
All Crankshaft Counterweights Are Turned and Beveled in a Single Automatic Operation by the Simplimatic.

#### JUST OFF THE PRESS!

An entirely new Simplimatic catalog is ready—complete with the information and specifications you want, pictures and job facts. Write today!



The Simplimatic with part ready for loading. Tool blocks at this point are retracted for clearance and tool protection.







#### **HOW MAINTENANCE BALANCING PAYS FOR ITSELF**

Southern Railway Company Adds Life to Diesel-Electric Equipment

TIME-SAVING IDEAS

Southern Railway
Company is doing it,
too. In its Pegram Repair
Shop, Atlanta, they are getting
even greater efficiency and performance from diesel electric locomotives—through balancing. A 6U
DYNETRIC Balancer handles balancing in the maintenance of traction
motors and generator armatures.

An example is this traction motor armature. Measuring 4 feet long and weighing 2500 lbs., dynamic unbalance is located and measured to an accuracy of ¼ ounce inch. Corrections are made by welding small steel blocks on the core while the armature is still in the balancing machine. A final check for accuracy and possible operator error is then made.

On this large electrical part, the entire operation—setup, loading, checking, correcting, rechecking and unloading—only requires about one hour. Yet, this accuracy of balance—with smoother, vibrationless operation and lessened bearing wear—pays off in far longer life between overhauls, returning balancing costs many times over.

If maintenance of electrical equip-



ment is a problem of yours, ask for the article on balancing applications in railway shops. With it we will include the book *Static and Dynamic Balance*, which thoroughly covers the entire field of balancing.

Precision Balancing of Railway Electrical Equipment Greatly Reduces Frequency of Failure and Assures More Efficient Operation.





Dial indicates exact number of correction units required.

#### THE WAY TO BETTER CRANKSHAFTS-SUPERFINISH

#### Versatile Machine Handles Variety of Sizes

Even on diesel engine crankshafts, Superfinishing is a quick, inexpensive process.

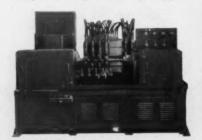
This Superfinisher is a Model 77, arranged to do both pin and main bearings on a variety of 4 and 6 throw crankshafts. Four sets of stones in each of the upper stoneholder assemblies handle the pin bearings. Lower assemblies each have two sets of stones for the main bearings.

Crankshafts come to the Superfinisher with rough ground bearing surfaces of 20-30 micro inches. After a 2.3 minute automatic cycle, surfaces measure 4-5 micro inches. What this finer smoothness means in greater crankshaft performance is obvious—

grinding chatter marks and smear metal are removed, there's improved geometry, added smoothness and longer bearing life.

See how your own problems can be solved by Superfinishing. Write for your complimentary copy of "Wear and Surface Finish."

Superfinishing These Crankshaft Bearings Not Only Assures Longer Lasting Surfaces, but It Also Cuts Grinding Time and Costs.



Model 77 Superfinisher for 4 and 6 throw crankshafts.



Close-up showing upper and lower stoneholder assemblies for Superfinishing pin and main bearing simultaneously.

No. 9-1052

599



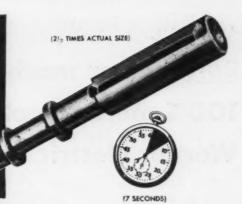
THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT

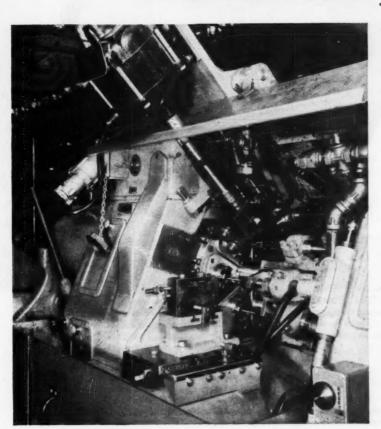
Madison 10, Wisconsin

TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . SPECIAL MACHINES

This copper alloy part completely machined in 7 seconds—eliminating 3 secondary operations



# ACME-GRIDLEY BAR AUTOMATIC PERFORMANCE PLUS



Blanking, slotting the radius and back drilling are included in the twelve operations done by the Acme-Gridley in 7 seconds. Any one of these, done as a second operation, would take an equal amount of time.

Think of the savings in handling time, in machining time, in man-hours. And remember, these second operations can not be handled in one set-up unless the machine provides the wide, open tooling zones required for independent-power-driven auxiliaries—a feature of Acme-Gridley design.

This is no stunt job—it is typical of the savings thousands of users are making through Acme-Gridley tooling ingenuity. May we show how it can cut your costs?

#### JOB FACTS

PART—Socket post,  $17/16'' \log \times .188'' \dim$ . MATERIAL—Copper Alloy

OPERATIONS—12, including slot radius, pick off and back drill, concentric with front drill

TIME-7 seconds, complete

MACHINE—Acme-Gridley RA-6 Spindle Bac Automatic

## The NATIONAL ACME CO.

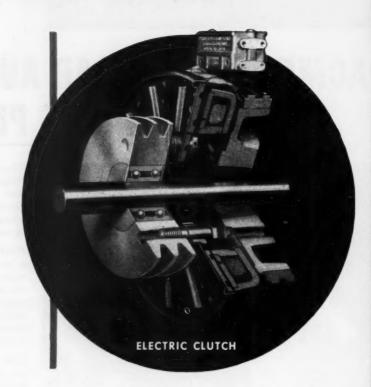
170 FAST 1314 STREET . CLEVELAND & OHIO

ACME-GRIDLEY BAR and CHUCK-ING AUTOMATICS built in 1, 4, 6 and 8 spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

# Burgmaster machine "quick on its feet" 100% more saleable, with new Warner Electric Clutch features

# WARNER electric motion control

- speeds operation 20%
- simplifies assembly and installation
- eliminates maintenance and repairs
- protects equipment and reduces machine wear
- smooths operation and eliminates noise
- improves saleability 100%



FAST speed changes are "duck soup" on this rapidfire Burgmaster drilling and tapping machine. The operator merely turns a 4-position control knob—one knob for each spindle—to quickly select the right speed for the job. Warner Clutches engage the high or low speed pulleys electrically. With the two-speed, electric clutch drive, two-speed motor, and three sets of gear ratios, 12 spindle speeds are immediately available without a second of waste time for shifting belts or changing gears!

Consider some of the important design advantages "chalked up" on this application by the new Warner

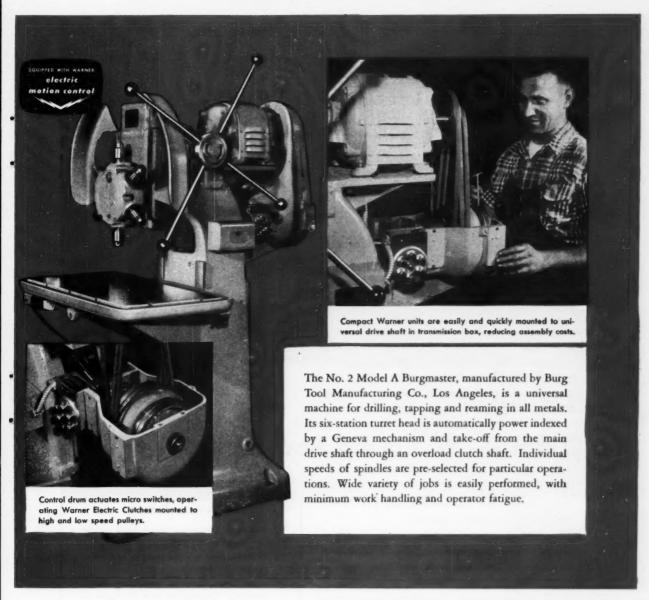
Electric Clutches. Operation of the clutch drive is now 20% faster. No servicing or wear adjustments are required. An overload feature reduces machine wear—protects it from possible damage. Operation is smoother and quieter. Ease of assembly cuts manufacturing costs. And—most important—saleability of the product is increased 100%!

Improve customer acceptance of your machine—improve its clutching, braking, speed control, tensioning, or indexing efficiency—easily and simply with the amazing new automatic features of Warner electric motion control. Write for details!



#### **ELECTRIC BRAKES & CLUTCHES**

FOR INDUSTRIAL APPLICATIONS



Warner Electric Brakes, Clutches and Clutch-Brakes give you new, unique simplicity of design and operation. There are only two main parts, an armature and magnet. Operation is by electro-magnetic, instantaneous engagement and release of friction surfaces. Torque ratings are extremely high for small size and light weight. No coasting or slipping when "locked in." Easily designed into original equipment. Readily adapted to automatic cycles and remote control by limit switches, relays, electric-eyes, pushbuttons, etc.

Rate of application accurately controlled to synchronize motions—give exact degree of speed and power required.

COMPLETE ENGINEERING SERVICE... Warner offers complete application and design engineering service and field assistance. If you have a clutching, braking, tensioning, indexing or speed control problem, consult competent, experienced Warner brake and clutch specialists for reliable recommendations on torque, heat, electrical controls, capacity, etc.

9.3	FREE DEMONSTRATION	Warner Electric Brake & Beloit, Wis.	Clutch Co., Dept. M.	OUR 25th YEAR
	Test the high torque, instant speed and case of control of electric brakes and clutches right on your desk top. Paste coupon to	Please send your FREE Bulletin No. 703-A  Have your representative call to discuss my problem.		
		Firm Name		
100 A		Individual	Title	
		Address		
		City	State	

# Machining Time on Pump Casings Cut 45% at De Laval Steam Turbine Co.



#### FOR DEEP BORING:

#### The Simmons 6" Boring and Facing Machine

When installed in De Laval's boring department, the Simmons 6-in. Bar Horizontal Boring and Facing Machine proved itself in no time.

In boring and facing single-stage pump casings, it cut previous average machining time by 45%. And in machining worm gear cases, machining time was cut by 50%.

"The Simmons machine has all the horsepower we need," says De Laval's foreman of the boring department. "In fact, it has the horsepower, the speeds and feeds we need for carbide tooling. And that's why we've been able to boost our output so substantially."

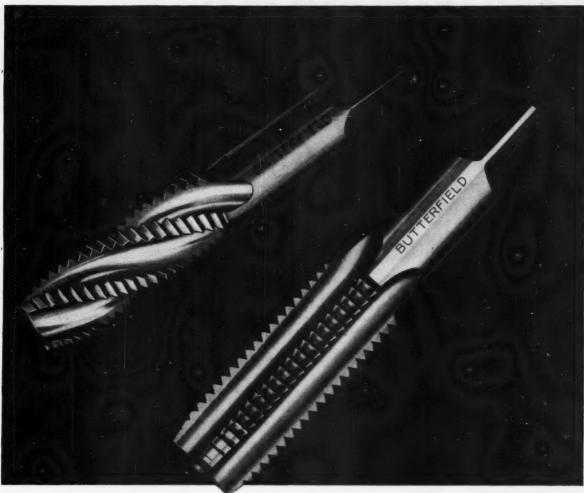
There's really no such thing as the Simmons 6-in. Boring and Facing Machine. It's actually many machines—all based on the same unit-type construction, but each adapted to the special needs of different manufacturers. It can be adapted to your needs, too, no matter what your deep-boring job. Write for details.

#### Check these features

- Automatic, continuous facing head permits high-speed facing with carbide tools.
- Hydraulic feed to entire head in addition to normal bar feed.
- Boring head fed to and from work reduces overhang of boring bar to a minimum—resulting in greater accuracy.
- A range of bar speeds between 3 and 200 rpm and bar feeds from 0.0005 in. to 0.500 in. per revolution can be supplied.
- 5. Up to 50 HP motor drive.
- 6. Precision anti-friction bearings used throughout.
- Standard bar length is 17 ft.; travel in one setting is 72 in. Bed lengths and widths supplied to your needs.
- Unit-type construction enables basic boring and facing unit to be adapted to your special requirements.

#### SIMMONS MACHINE TOOL CORPORATION

1600 North Broadway, Albany 1, New York



## THEY BRING ASSURED ACCURACY TO YOUR TAPPING JOBS

With Butterfield Taps you eliminate all risk of getting a defective tap that has been overlooked in ordinary factory spot-checking.

Each Butterfield Tap is individually inspected to make sure it will do a fast, clean, trouble-free job of threading.

That's why continued use of these

100% inspected tools is a long range policy that pays off in smoother, more economical production.

In the complete Butterfield line there's a tap for best results in every tapping application, in every material. Union Twist Drill Company, BUTTER-FIELD DIVISION, Derby Line, Vermont. In Canada: Rock Island, Quebec.



INSPECTOR checks thread form and lead on a Hartness Comparator that magnifies 62½ diameters. Part of Butterfield's 100% inspection.

Hand Taps • Machine Screw Taps • Pipe Taps
Stove Bolt Taps • Pulley Taps
Staybolt Taps • Boiler Taps • Nut Taps
Serial Taps • Mud or Washout Taps

SEE YOUR NEARBY BUTTERFIELD DISTRIBUTOR FOR PROMPT DELIVERIES AND SERVICE

#### BUTTERFIELD

THE 100% INSPECTED TOOLS

**Every Tool Individually Inspected** 

TAPS . DIES . REAMERS . SCREW PLATES

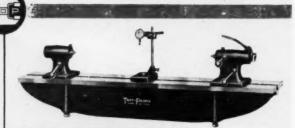
# Some TAFT-PEIRCE Shortcuts to PRECISION

in Production and Inspection



#### T-P PRECISION LEVELS

measure variations from the horizontal in calibrations of either .0003" or .0005" per foot. Supersensitive and extra-sturdy, adjustable level beam permits self-checking.



#### T-P BENCH CENTERS

simplify inspection work. Have unusual rigidity and permanent accuracy. This is typical of a wide range of inspection tools available at Taft-Peirce.



#### T.P OFFSET BORING HEAD

speeds accurate boring of light machine parts or special tools. Adjustable cross-slide has 3/4" travel from center. Cross-slide screw is graduated in thousandths. Available with standard or special shanks.



#### T-P ANGLE BLOCK & SINE BAR SET

simplify setup and grinding of small angular work on a magnetic chuck. Angle Blocks can produce any angle from 0° to 90° by quarter degree increments. Can be used individually or in any combination to form V-Blocks.



#### T-P ADJUSTABLE T-PLATE

makes quick work of locating angles accurately on machine tables. Vernier scale reads within 5 minutes of angle. Available in standard size tongues for conventional T-slots. Special tongues made to order. For the complete story on these items and many more, get your copy of the new Tast-Peirce Handbook, just off the press.



THE TAFT-PEIRCE
MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND

# They wouldn't believe it either wouldn't believe it either wouldn't believe it either water they SAW it

was believing for a group of mechanical officials from one of the mid-west's management earth moving equipment

Frankly they just wouldn't blieve that the new 32" "AMERICAN" Paraker Lathe would effectively use 60 horse prer and comented carbide cutting tools machining rough and touch allow street

forgings. So they came to see for themselves and they saw:

- Cuts 13/8" deep.
- Z Cutting speed 300 feet per minute.
- 3 .030" feed.
- 60 horse power registered by horse power meter during the maximum cuts.

Not a shimmy or whimper from the machine.

They were amazed and convinced.

with the lower, stamina and convenience combine to produce a thorough dependable and highly productive unit.

etin No. 44 tells all . . . have one?

THE AMERICAN TOUC TOURCE.

Cincinnati, Ohio U.S.

ATHES AND RADIAL DITLES

# Pantography at Work!

Inside profiling operation produces more than 36 pieces per hour with Gorton Tracer Control. Approximate time by the next best method . . . one piece every two hours.

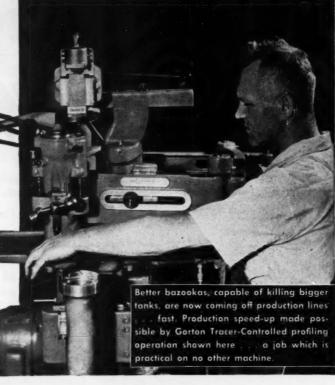
#### GORTON

- IMPROVES QUALITY
- INCREASES PRODUCTION
- CUTS COSTS

On many all-but-impossible jobs, Gorton Tracer-Controlled Pantographs and Duplicators speed up production on military or industrial contracts. High surface finish results from spindle speeds up to 45,000 R.P.M. Accuracy results from the use of over-size masters, patterns, or templates together with the reduction ratio which is exclusively characteristic of the pantograph. Whether a dozen or a thousand pieces, each is identical to the first. Work piece size varies from instrument parts to areas of 10 by 20 feet.

Gorton tracer-controlled equipment quickly pays for itself in profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving as well as many other standard or special operations on ferrous or non-ferrous metals and plastics where work is flat, uniformly curved, cylindrical, spherical or irregular in shape.

Mail the coupon below for General Catalog illustrating the complete Gorton line.



#### PRODUCTION DATA-

JOB: Profile 6 locking lugs for male and female sections of new 3.5" Bazooka.

MATERIAL: Aluminum alloy.

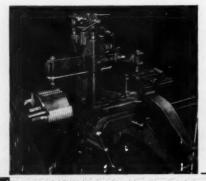
CUTTER: 5/32" dia. single flute, fast spiral H.S. steel running at 3,900 R.P.M., without coolant.

MASTER: 2 masters: one for male and one for female sections; 3 times oversize, traced manually.

HOLDING FIXTURE: Pneumatic-operated internal expanding type.

APPROX. TIME: 36 pieces per hour.

ALTERNATE METHODS: None practical.



#### THIS OPERATION SPEEDED UP 6 TIMES

Gorton Tracer Control chamfers ends of interrupted threads in breech ring and on breech block of 155 mm. gun. Previous time, 4 hours; Gorton time, 40 minutes.

GEORGE
GORTON
MACHINE CO

1310 RACINE STREET

RACINE, WIS., U.S.A.

48-MACHINERY, October, 1952

P3554-



SPLINE SHAFTS

Through 35 years of gear making, these are the 10 gear types that have emerged as our specialties.

If one (or more) of these types is included in your product, it may pay you to review the facts about Double Diamond Gears contained in this new book.

We will be happy to send you a copy. Why not write for one today?



FOR AUTOMOTIVE, FARM EQUIPMENT & GENERAL INDUSTRIAL APPLICATIONS

AUTOMOTIVE GEAR WORKS





#### \* GET MORE FOR YOUR MONEY . . . get Carlton Radial Drills:

#### **MECHANICAL ADVANTAGES**

Ground teeth, hardened gears with wide faces.

Hardened spindle.

Ball and roller bearings.

Column clamp mounted in Arm.

All parts, wherever possible, are ma-nined from drop and hammered forgings.

#### MAINTENANCE ADVANTAGES

Every part is jig machined to guarantee absolute interchangeability of

Entire machine is assembled on the

Only one friction clutch unit to adjust. Simple electric circuits to all motors. Easier to keep clean.

#### **OPERATION ADVANTAGES**

Dual clamping to Head and Column. Automatic clamping for Arm to Column.

Pushbutton operated Arm elevating

Automatic lubrication to column with column cleaned by wipers from top to

2 levers control 36 spindle speeds from Head.

Direct reading and indicating speed and feed chart.

Electric light built in Head near

Adjustable counterbalancing spring operating with standard geared-to-spindle counterweight.

Positive feed clutch with serrated

THE CARLTON MACHINE TOOL CO.

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO, U. S. A.



## "Tycol Afton keeps cutting edges

# cool...lengthens tool life between grinds"

Right! Tycol Afton Cutting Oil steps up tool performance . . . allows closer tolerances and finer finishes.

It makes fast, free cuts possible—reduces spoilage and the need for frequent regrinding.

Tycol Afton is a "dual purpose" oil, used for both cutting AND machine lubrication. Several grades are available for use on any specific machine tool.

For complete information, call or wire your nearest

Tide Water Associated office today.

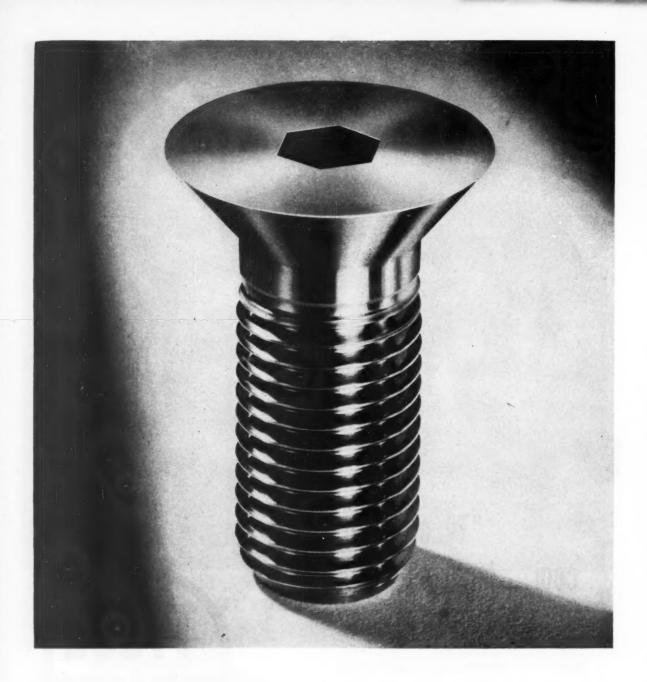


Boston • Charlotte, N. C. • Pittsburgh Philadelphia • Chicago • Detroit Tulsa • Cleveland • San Francisco

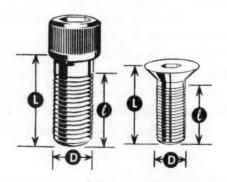


SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"

MACHINERY, October, 1952-51



UNBRAKO SOCKET SCREW DIVISION



#### WHY IS IT THAT 75% OF ALL SPECIAL SOCKET SCREWS ORDERED FROM SPS HAVE ODD THREAD LENGTHS?

75% of all screws classified by SPS as specials have odd thread lengths, probably because of widespread unfamiliarity with thread formulas.

In many cases, standard UNBRAKO Socket Screws can be substituted. They will save you time and money. They are available from the stocks of your local distributor. Ask him or write us for your copy of Unbrako Standards. Standard Pressed Steel Co., Jenkintown 19, Pennsylvania.

#### What Are the Standard Thread Lengths?

The authority for the thread formulas used by SPS and other threaded fastener manufacturers is Handbook H28, Screw Thread Standards for Federal Services, National Bureau of Standards. It reads:

The length of the screw thread is measured from the extreme point to the last usable thread and shall be as follow.

For American National Coarse Thread Series 2D +  $\frac{1}{2}$ " (where this length of thread would be greater than half the screw length).

 $\ell=\frac{\%L}{\text{than 2D}}+\frac{\%L}{\%}$  (where this length of thread would be greater

For American National Fine Thread Series 1%D+%'' (where this length of thread would be greater than three-eighths the screw length).

 $\ell=\%L$  (where this length of thread would be greater than 1%D+%")

Screws too short to allow application of these formulas shall be threaded as close to the head as practicable.









MACHINERY, October, 1952-53

# Designer's



FIRST step up in Progressive Mechanization's step-by-step approach is replacing hand operations with simple machines.



**SECOND** stage brings in improved machines. Example: grinding wheel with high-frequency motor for small-hole finishing.



THIRD change introduces automatic control for more complex machines, in this case an automatic multiple milling machine.



FOURTH level is continuous process with co-ordinated machines, like this automatic transfer machine for cylinder blocks.

# New PROGRESSIVE MECHANIZATION program promotes your long-range machine sales

As a machinery manufacturer, you have an important stake in "Progressive Mechanization," the new More Power to America program just launched by General Electric. Addressed to your customers, it introduces a planned, step-by-step approach to the goal of greater mechanization in industry—a practical way to bring about increased productivity, better products, and lower manufacturing costs.

Widening the long-range market for the machines you build, this co-operative program comprises a sound-color movie, a descriptive manual and a survey form and checklist. For more information on Progressive Mechanization, ask your G-E Apparatus representative to arrange a showing of the movie. Meanwhile, send for your free copy of the program manual, GEA-5789.



# Digest et product highlights

#### THIS METER "CLOCKS" MACHINES, SAVES USERS TIME AND MATERIAL



When you equip your machine with a G-E Type KT time meter, your customer has an accurate record of active, earning machine time. Savings in time and material pay for the meter many times over. Panelmounted (shown), portable, and conduit-mounted types record hours, tenths of hours, or minutes. See Bulletin GEC-472.

### NEW FHP MOTOR SMALLER, LIGHTER, BETTER LOOKING, MORE VERSATILE

Here are just four of the many advantages you'll find in G.E.'s new Form G fractional-hp motor: Smaller size saves space on driven machines. Lighter weight cuts your handling and shipping costs. Better appearance enhances product sales appeal. Versatile, allangle operation means this standard motor can often replace specials. See Bulletin GEA-5567.



#### ALL OPERATORS INTERCHANGEABLE IN BIG NEW PUSH-BUTTON LINE



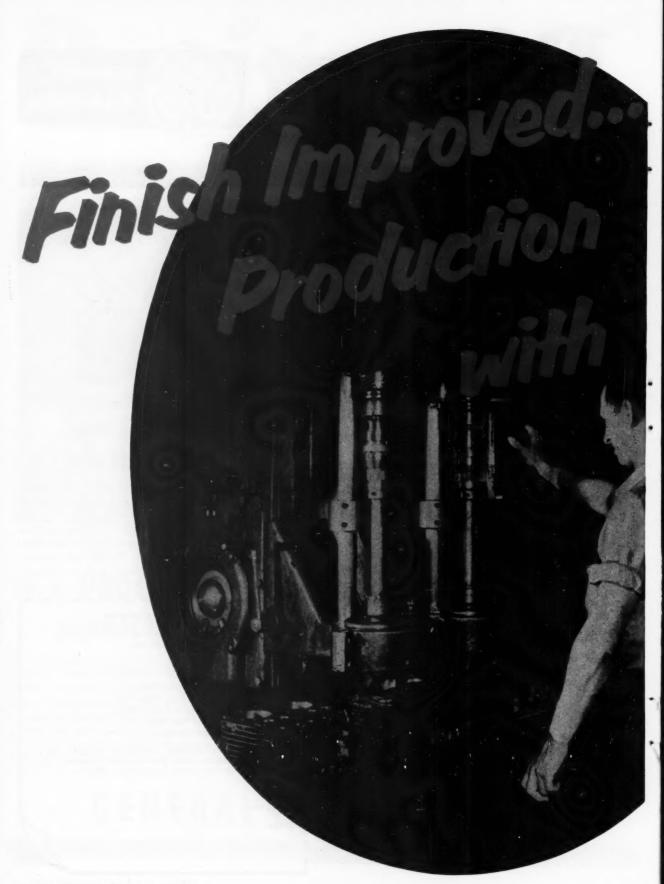
Your every design need is met in General Electric's big new line of oiltight pushbutton units. Just one example of its "building-block flexibility" is the complete range of separable, interchangeable operators available. You benefit from off-the-shelf shipments, smaller inventories, faster assembly of components. See Bulletin GEA-5779.



# Build in electric heat — clean, convenient, easily controlled

In each package-making machine built by a Massachusetts company, eight General Electric tubular heaters are imbedded in the block which shapes packages, melts paraffin, and dries glue. When your machine needs a "zone" of heat, specify a G-E electric heater for clean, convenient, easily-controlled heat. The full line includes immersion, strip, cartridge, tubular, and fin heaters. See 64-page Bulletin GEC-1005.

	ral Electric Company, Section 8668-96 nectady 5, New York
Ple	ase send me the following bulletins:
V	for reference purposes
X	in connection with immediate projects
	GEA-5567 Form G F-hp Motors
	GEA-5779 Oiltight Push-button Units
	GEA-5789 Progressive Mechanization
	GEC-472 Type KT Time Meter
	GEC-1005 Electric heaters
PROD	ULT YOUR McGRAW-HILL ELECTRICAL CATALOG FOR UCT ENGINEERS! You'll find "everything electric" for nery manufacturers in the General Electric Section.
NAM	I
сом	PANY
STREE	1



56-MACHINERY, October, 1952

# Increased Increa

The Wisconsin Motors Corp., Milwaukee, makes small, precision-built, air-cooled engines. In honing the cylinder bores, operators were getting unsatisfactory results. Stones were loading and glazing and cylinder blocks heated excessively, resulting in distorted bores, scratched surfaces and necessitating considerable reworking.

Then the shop replaced the fluid in use with Sinclair HONOL.® This specially developed honing oil so reduced loading and glazing of the stones and the build-up of excessive heat, that size control was immediately improved. And with HONOL, stone life was prolonged, finish was greatly improved and, most important of all, the need for re-working many cylinders was eliminated. It is now rare for Wisconsin Motors to have any honing problems.

There is a grade of Sinclair HONOL for every honing requirement. It can improve finish, speed production . . . save money. Contact your nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

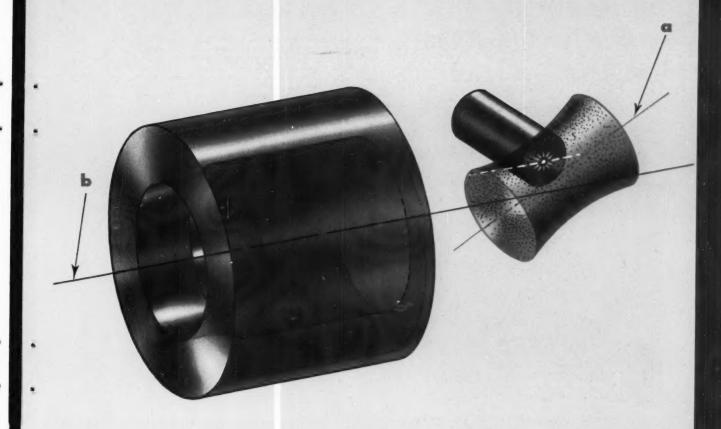
and COOLANTS

and Coolants

for metal working

# PH Flexible Sealing... T-J AIR CYLINDER



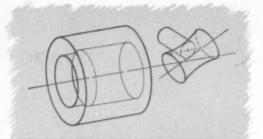


bryant internal grinding T is generally believed in internal grinding that once the grinding wheel passes the diamond, the form of the wheel will be a perfect cylinder. In our illustration the wheel is tipped as it passes the diamond and an hourglass form is generated on the wheel. This condition is not peculiar to an internal grinder. The same form is generated in turning an O.D. on a lathe if the tailstock is either high or low.

The path of the diamond is a straight line across the surface of the wheel, but the wheel will not contact the work on the same straight line. Contact may be at a point on each end of the wheel. Since the wheel does not contact across its full face, wheel wear will be excessive and the wheel will act soft.

The geometry of the hole may be upset as in the illustration, with the result that the back of the hole will be tight. Neither turning the workhead nor changing the length of traverse will correct this error. Because the wheel is contacting at either one or two points, instead of a straight line, the surface finish will be poor. The remedy is to correct the alignment by bringing the wheel center line "a" parallel with the path of the wheel and in plane with the work center line "b".

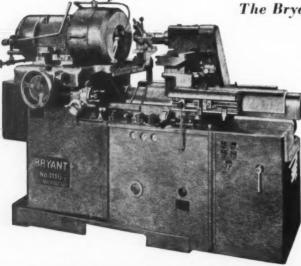
Bryant Chucking Grinder Co. Springfield, Vermont



## bryant internal grinding

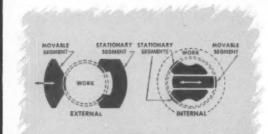
Accurate alignment of various machine elements is a basic consideration on even the simplest machine tool. Industry's demand for increased production and accuracy makes the alignment problem more critical than ever before. Bryant machines are designed so that they may be aligned, and this alignment may be maintained throughout the life of the grinder. Alignment and its effect on precision hole grinding is discussed on the preceding page.





This is a precision toolroom and production hole grinder with all features and controls necessary for handling a variety of work with minimum time and effort. It has a swing of 16" with 8" maximum hole depth. The rigid 3-point wheel spindle support consists of a bar mounted in 2 cylindrical bearings with the rear of the slide supported on a hardened and ground guide plate. Tapers up to 90° included angle may be ground. A face grinding spindle may be used in addition to the hole grinding spindle. Write for full information.

#### Bryant Chucking Grinder Co., Springfield, Vermont, U. S. A.



#### bryant thread gaging

Bryant gages are built on the principle of an "expanding" master plug for checking internal parts, or a "contracting" master ring for checking internal threads. A dial indicator gives a reading of P.D. which includes variation in thread form and lead. This is an accurate indication of assembleability.

#### The Bryant Thread Gage with Squareness-of-Face Attachment



When a face must be checked square with an internal thread, the part should be held on the thread flank and rotated in this position. The Bryant Gage does this, regardless of variation in roundness, P.D., lead or thread form. The squareness-of-face indicator is raised by a yoke at a constant rate regardless of face run-out, thus giving a direct and exact reading of squareness with the thread axis. Simultaneous readings can be made — the Bryant Gage checks thread size — the Attachment shows face run-out.



- Engineers at Arwood Precision Casting Co. use TOCCO Induction Melting Furnaces for melting and remelting quality steel. Other companies have found TOCCO equally adaptable for melting non-ferrous metals. No wonder! Look at the advantages:
- \* Stepless power control
- \* Extremely Rapid Melting
- \* High Efficiency on Intermittent Operation
- \* Good Mixing because of Natural Agitation
- ★ Extremely Low Alloy Loss
- ★ No Carbon Pick-up
- ★ No Contamination when Composition of Charges is Changed
- ★ High Reproducibility of Results
- \* Minimum Space Requirements
- \* No Special Installation Charge
- \* Simple, Safe Operation
- \* Clean, Comfortable Working Conditions

If any of these advantages suggest economies in your operations write for full details—no obligation, of course.

THE OHIO CRANKSHAFT COMPANY . CLEVELAND 1, OHIO

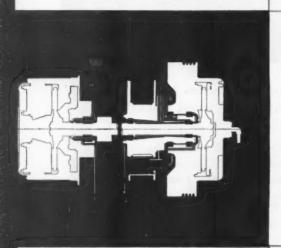


Induction Heating Equipment must meet the requirements of the Federal Communication Commission's Rules and Regulations Relating to Industrial, Scientific and Medical Services, Part 18. All TOCCO equipment is certified to comply with these rules and regulations.

# when you buy presses ... take a close look at lubrication

Automatic oil lubrication saves hundreds of hours of press maintenance, decreases the hazard of damage due to lubrication failure or neglect and greatly reduces press down time. Your press is protected!

This Danly feature-and others like the exclusive Danly Cool-Running Clutch and extra rigid construction-explains why new plants and new production lines throughout industry are being equipped with . . .



Danly's complete engineering staff is at your service to help you select the best presses for your job. Write today—and ask for the Danly Straight Side Press Catalog.



#### DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

It costs less to run a DANLY PRESS!





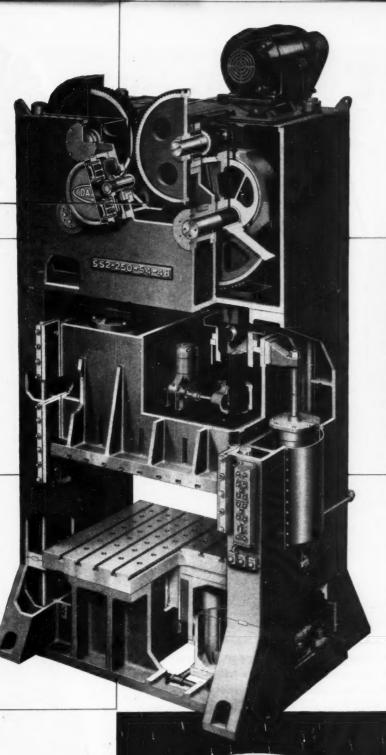


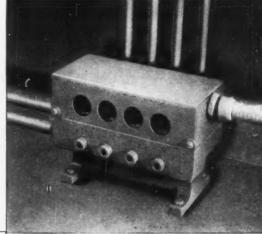




#### POSITIVE OIL LUBRICATION-ELECTRICALLY CONTROLLED

Diagram at left indicates important drive shaft bearing lubrication system. Oil, shown in color, is piped under pressure to the bearings—all anti-friction type. Any drop in oil pressure below normal operating levels in this completely automatic system stops the press—positive protection against damage due to lack of lubrication.





#### AUTOMATIC GUARDIAN OF PRESS LUBRICATION

Close-up view of special Danly oil pressure safety switch. This switch completes the Danly lubrication protection system by stopping the press immediately in the event of oil stoppage in any line—and indicates the faulty line!

#### CONTINUOUS AUTOMATIC OIL LUBRICATION INCLUDES GIBS

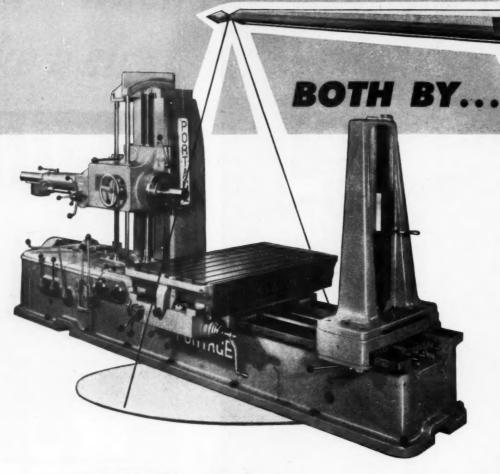
Cutaway at left shows how Danly Presses provide complete automatic lubrication (in color) to the drive mechanism and slide—including gibs.

- Maintenance is reduced by preventing needless breakdowns arising from irregular or insufficient lubrication.
- Oil supplied continuously under pressure to gibs permits extremely close slide adjustment—prolonging die life.



MECHANICAL PRESSES ... 50 TO 3000 TONS HYDRAULIC METALWORKING EQUIPMENT

# THE RIGHT BORING MILL...



#### \* BORING, MILLING, DRILLING

This is the horizontal boring mill that is unexcelled for accuracy, rigidity, convenience, and safety. All control levers on the front of the machine. Precise repositioning of bar support bearing. Power rapid traverse. Hand adjustments provided in addition to automatic feeds. Forced and filtered automatic pressure lubrication. Built for greater capacity with large table and extra high column. Completely built by PORTAGE—Builder of precision machinery for over a third of a century.



#### THE PORTAGE MACHINE COMPANY

1069 SWEITZER AVENUE

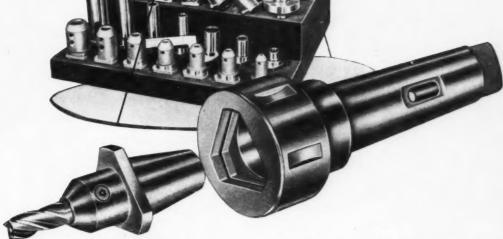
AKRON 11, OHIO

Dealers in All Principal Cities



P. D. Q. PORTAGE DOUBLE-QUICK TOOLS

COMPLETE SET



Look at the engineering features of these new Portage Quick Change Tool holders and adaptors.

- 1. Precision ground tapered seat to insure positive re-positioning.
- Only Portage has this more positive triple lock.
- Triangle drive distributes torque equally.
- Six spanner slots for quick locking and unlocking.
- Only one moving part. 5.
- 6. Ground threads for greater accuracy and easier operation.
- 7. All parts heat treated.

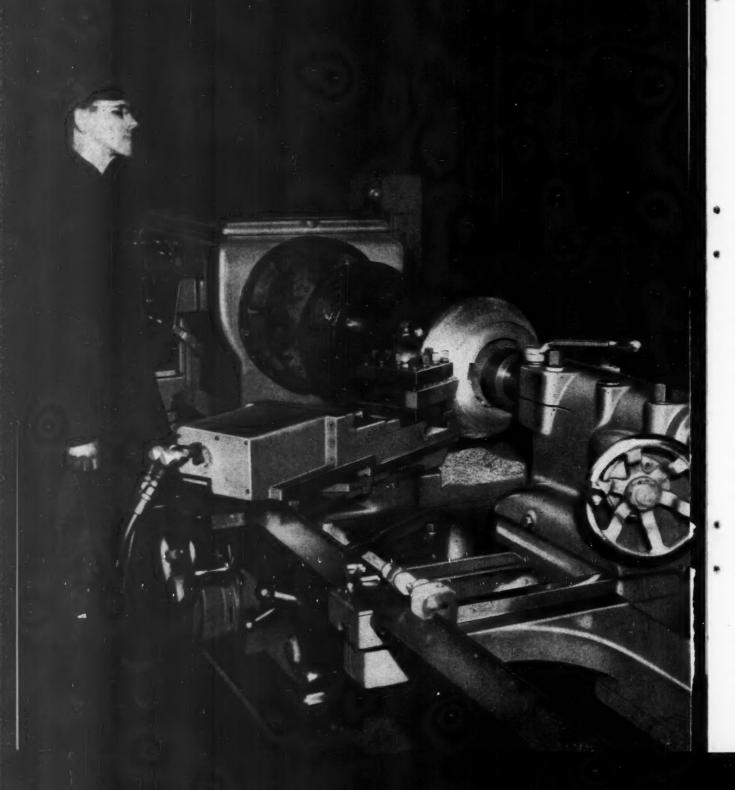
Available in complete set or individual tools. Write for calalog on these better tools that will also cut your changing time to a matter of seconds

THE PORTAGE Double Quick TOOL COMPANY

AVENUE AKRON

Dealers in All Principal Cities

# contouring time cut 58½%



## with LeBlond Hydra-Trace

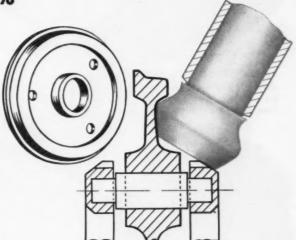
wheel mill roll life boosted 50%

Standard Steel Works Division of Baldwin-Lima-Hamilton Corporation—whose forges first flamed into production in 1795—supplies America's railroads with one-piece, wrought steel car and locomotive wheels. And Standard

Steel officials credit LeBlond Hydra-Trace for contributing to their outstanding success in producing these wheels at competitive cost in the quantities needed.

At Standard's Burnham, Pennsylvania Works, rolls of alloy steel are turned to contour and then put to work shaping wheels. The intense pressure and heat of this hot-rolling operation soon work-hardens and wears the rolls out of contour. Formerly a skilled operator—tediously matching contours with a hand-held template—redressed the rolls manually. Four dressings were considered long service for a roll . . . and the work-hardened surface quickly dulled carbide turning tools.

Now, with Hydra-Trace installed on a 25" LeBlond Heavy Duty Lathe, Standard Steel chalks up big savings under all three headings—man hours, material and tool life. As Marty Gotwalt of Swind Machinery—LeBlond's Philadelphia distributor—puts it, "Hydra-Trace automatically keeps the tool just under the workhardened skin. We've lopped 14 hours off what used to be a 24 hour job."



And that's not all. Minimum metal-removal by the Hydra-Trace method frequently saves Standard's wheel mill rolls for six dressings—a bonus of two over the manual method.

Whether your turning problems—like the wheel mill rolls at Standard Steel—center in the toolroom or demand stepped-up output on the production line, Hydra-Trace is ready to help. For all LeBlond Heavy Duty Lathes built since 1935, this template-controlled, hydraulically powered tracer can be mounted in minutes. Templates are flat, compact, and suitable for both rough and finish turning. Call your LeBlond distributor or write

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8. OHIO

Ask for Bulletin HT2D for complete details on LeBlond Hydra-Trace

turned faster by



WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES . FOR MORE THAN 64 YEARS



Series "QH" Hydraulic Pumps . . . 4 sizes, for continuous pressures up to 1200 p.s.i.," intermittent to 1500. Deliveries from 3 to 12 g.p.m. at 1200 r.p.m.

IMMEDIATE

need pumps





Series "B" Hydraulic Pumps . . . 3 sizes, for continuous pressures up to 1000 p.s.i. Deliveries from .4 to 1.5 g.p.m. at 1800 r.p.m.

IMMEDIATE DELVERY



Series "O" Hydraulic Pumps . . . 4 sizes, for continuous pressures up to 1000 p.s.i. Deliveries from 20 to 40 g.p.m. at 1200 r.p.m.

call or wire

GEROTOR MAY CORPORATION

Maryland Avenue and Oliver Street Baltimore 3, Md. • Phone MUlberry 8585



Mount Palomar Observatory --- 69 miles north of San Diego, California

Kaufman & Fabry Photo

#### The Invisible Background of Industrial Progress

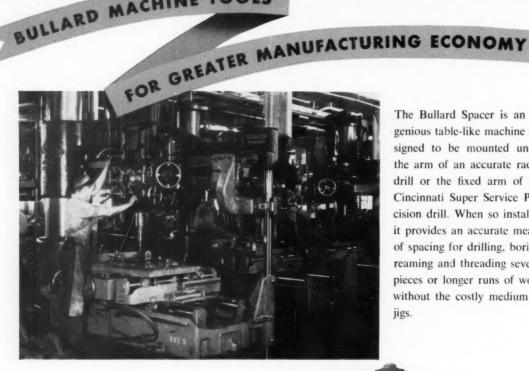
Among the many advancements in our country of free enterprise are the products of scientific research. Representative of such work is Mount Palomar Observatory of the California Institute of Technology. Located 69 miles north of San Diego, California, its 200-inch lens, ground at the University, brings the moon to within 28 miles of the earth. Palomar's big telescope used for photographing celestial objects can reach out to explore a spherical section of the Universe so colossal that light traveling 186,000 miles a second takes 2 billion years to cross the section. Such scientific equipment will permit more complete studies of the Universe and the effects of outlying bodies on our own world . . . In The Invisible Background of Industrial Progress are the manufacturers who use

\*Modern Machine Tools that enter into the many steps in the making of glass, grinding of lenses, producing delicate machinery and hundreds of other items required in the innumerable phases of scientific research.

BRIDGEPORT 2 CONNECTICUT

**★**For greater manufacturing economy REFER to next page

BULLARD MACHINE TOOLS



The Bullard Spacer is an ingenious table-like machine designed to be mounted under the arm of an accurate radial drill or the fixed arm of the Cincinnati Super Service Precision drill. When so installed it provides an accurate means of spacing for drilling, boring, reaming and threading several pieces or longer runs of work without the costly medium of jigs.

In actual use, several hundred of these Spacers have not only proved their reproductive accuracy but have shown almost unbelievable savings in manufacturing costs. In many instances it has proved profitable to discard numerous jigs. In others where new products are in the design stage, the spacer operations were laid out and work was quickly put into production, without the usual delay required in jig design and jig fabrication.

BULLARD

Bullard Spacer with a 32" x 40" table has 30" longitudinal and 20" transverse travels providing for a maximum of 260 hole locations in a single setting of the stops. Write for complete specifications.

BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

# ARE YOU GETTING ALL THESE BENEFITS FROM YOUR CUTTING FLUID?

.... LUBRICITY

to withstand pressure and reduce friction

.... VERSATILITY

one cutting fluid to do 90% of all jobs

.... ANTISEPTIC PROPERTIES

no skin sores, no rancid odors

.... FILM STRENGTH

which gives you longer tool life

.... COOLER WORK

which can be handled bare-handed

....LOWER COSTS

less than 8¢ a gal., in the machine

YOU GET THEM ALL WITH

#### ANTISEP doubles tool life for Portland manufacturer — pt 1/5 the cost of pil!

Operation consists of forming, threading and tapping stainless steel pipe nipples from 316, 340 and 303 type steel. This company switched from straight oil—costing 42¢ per gallon—to Antisep A.P. Base mixed one part to 30 with water—at a cost of about 8¢ per gallon.

LATEST REPORT—'Getting better finish

at 1/5 the cost of oil formerly used."
Their operators also like Antisep because there's no smoke and work comes off clean.





L & CO.

Ready to give you on-the-job service . . .



TOOL BUILDERS, GIVES ALL THE SERVICES YOU WANT WHEN BUYING MACHINE TOOLS.

#### DEMONSTRATION

Many machine tools can be demonstrated at our show room.

#### SELECTION

Engineers, thoroughly familiar with machine tools, will assist you in selecting the right equipment for the job. They can suggest the best methods for maintaining optimum production and for holding closest tolerances.

#### INSTALLATION

Trained specialists will, in most cases, supervise the installation and check the performance of the machines at your plant. They will also instruct your operators on the various techniques for obtaining the best machining results.

#### GUARANTEE

Cosa guarantees its machines to be free of defective workmanship and materials, replacing any defective parts or materials free of charge for a period of one year after delivery to you.

#### SERVICE

You are not forgotten after the machines are delivered. A staff of skilled service men is available to keep your equipment running at peak performance. Essential spare parts are stocked and others are obtained quickly.

#### EXTRA HELP

Cosa representatives abroad are in constant touch with the builders to expedite deliveries and to help solve promptly any unusual problems.

#### MACHINE TOOLS FOR YOUR PRODUCTION LINE OR TOOL ROOM

SWISS AUTOMATIC SCREW MACHINES • BORING, DRILLING AND MILLING MACHINES
BURNISHING MACHINES • CAM SHAPERS • COIL WINDING MACHINES
COLD SAWS • CUT-OFF MACHINES • DIE-SINKING MACHINES
DRILLING MACHINES — Bench . . Multi-Spindle . . Radial . . Sensitive . . Upright
ENGRAVING MACHINES — 2 & 3 Dimensional

GRINDING MACHINES — Carbide Tool.. Centerless.. Cylindrical.. Gear..
Internal & Face.. Profile.. Surface.. Thread Worm

JIG BORERS • LAPPING MACHINES • PINION CUTTING MACHINES

LATHES—Bench .. Boring .. Copying .. Engine .. Lead Screw .. Toolroom .. Turret .. Vertical Turret

MILLING MACHINES—Copying .. Horizoatal .. Profile .. Universal .. Vertical

PANTOGRAPH MACHINES • SAW SHARPENING MACHINES • THREAD CUTTING MACHINES

#### INSPECTION EQUIPMENT

**BALANCING MACHINES** 

COMPARATORS Mechanical — Electrical

**VICKERS HARDNESS TESTERS** 

MULTI-DIMENSIONAL INSPECTION EQUIPMENT

TOOLMAKER'S MICROSCOPES

COSA CORPORATION
405 Lexington Ave., New York 17

For all-round service, contact Cosa when planning your next machine tool purchase.

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

#### FRORIEP

#### VERTICAL TURRET LATHES

for · · : High Cutting Capacity

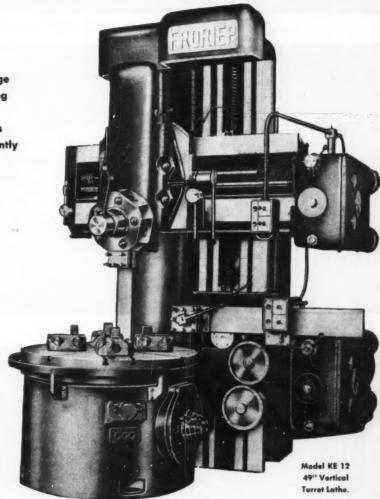
Quality Surface Finishes

Convenience of Operation

The rigid construction and ample range of speeds provide for maximum cutting efficiency with either carbide or high speed tools. Down time is minimized as all controls are centrally and conveniently located. Fine adjustments for cutting tools are so placed that operators can closely observe cutting edges—even on small workpieces.

The Froriep Vertical Turrets are made in four sizes having 39", 49", 55" and 63" diameter tables. They can be furnished with thread cutting equipment, taper turning equipment, tripping device, tracing device with electric tracer control and coolant system.

Write for catalog fully describing these Vertical Turret Lathes.



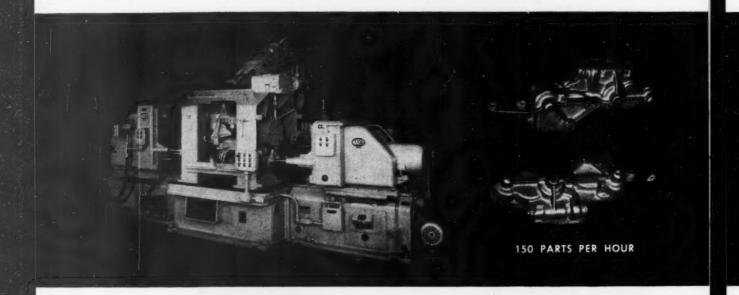
COSA S

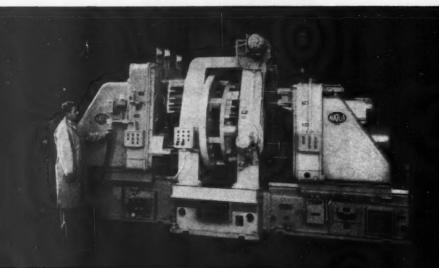
CORPORATION

RATION Your source for all Precision Machine Tools—
from Small Beach Lathes to Large Boring Mills

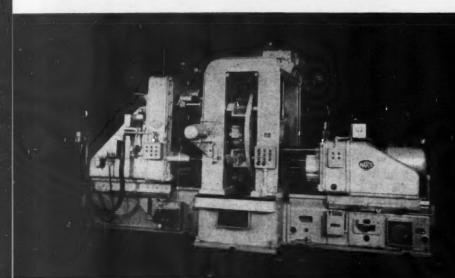
IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

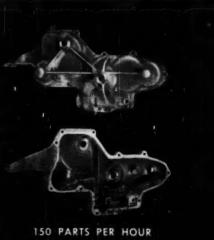
MACHINERY, October, 1952-73











## Hatco Engineered

FOR QUALITY AND QUANTITY PRODUCTION ...

Yes, the three NATCO HOLESTEEL Way Type machines shown here were NATCO engineered and NATCO built to produce high quality automatic washer gear cases.

Operations include drill, chamfer, ream, mill,counterbore,spotface,coredrill,plunge cut, hollow mill, face, groove and tap.

SY POPULAR DEMAND the new revised second edition of NATCO
"Drills and Drilling Practice" handbook is now available.
Send one dollar for this useful and valuable drill guide.





Call a Nation Field Engineer

To help you solve your problems in Drilling, Tapping, Boring & Facing.



NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices

1809 Engineering Bldg., Chicago + 409 New Center Bldg., Detroit 1807 Elmwood Ave., Bullalo + 2902 Commerce Bldg., New York City

#### FOR FASTER PRODUCTION, BETTER WORK, LOWER COSTS-

Large Hollow Spindle Type



**Both Illustrations Show** the 18" Hollow Spindle 71/8" Hole



- \* Machine work between centers.
- \* Also built with beds and carriages on each end of headstock for machining both ends of a shaft at one time.

SIZES 18" TO 36"

Small - 18" & 20" up to 7%"

Medium - 25" up to 12" Hole large - 32" & 36" up to 16%"

(Standard Type Lathes 16"-36")

## MACHINE COMPANY

#### IMPORTANT FEATURES

Timken Bearing Spindles.

Hydraulic clutches for forward and reverse, controlled from apron or headstock.

Hydraulic brake for close position control.

Hydraulic clutches self-compensating. No adjustment and full power capacity at all times.

CHOUTEAU AT GRAND . SAINT LOUIS 3, MISSOURI



MOTCH & MERRYWEATHER

End view showing transfer mechanism and 75 h.p. milling heads in retracted, accessible position.

#### to Rough-Mill and Finish-Mill Both Ends of Automotive Cylinder Blocks

· Cylinder blocks are fed to the machine, transferred from station to station, and discharged to the next operation. This machine forms an important link in a completely automatic production line.

THE MOTCH & MERRYWEATHER MACHINERY TO CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION - WITH - ACCURACY . MACHINES AND EQUIPMENT





STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



## How COOPER-BESSEMER Determines the Proper Order of Projects for Capital Investment

"We have set up our capital investment program on the lines recommended by the Machinery & Allied Products Institute. We use the MAPI Formula adapted to the special requirements of this company and our industry.

"One of the major problems we have had to solve is that of organization. We have two plants; naturally, they are competitors for any available funds for capital equipment. We have both foundries and machine shops at both plants, and they in turn are competing for funds. In order to determine the proper order of projects for capital investment, we have an equipment committee in each plant which reviews proposals. These proposals are then submitted to the Capital Equipment Review Committee. The Review Committee determines those projects that are to be submitted to the Board of Directors for approval.

"We feel that the scientific and thorough system advocated by MAPI has been a tremendous help in setting up a sound system under which we can operate. We are very pleased with the results we are obtaining."

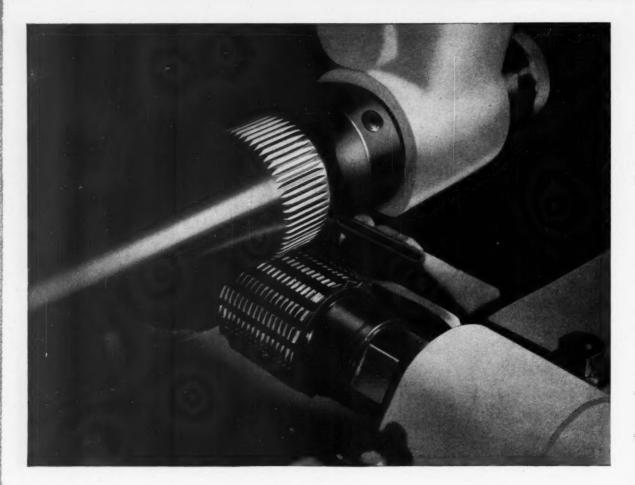
J. E. BROWN, Treasurer
THE COOPER-BESSEMER CORP.

ROCKFORD

INSERT

GROUP

Keep Gathering Metal-Working Production Ideas...Be Well Informed When The Time For Replacement Arrives . . . . . .



## Barber-Colman HOBBING DOUBLES TOOL LIFE - CUTS PRODUCTION TIME

HARD STEEL TORSION BARS, 45-50 R. C.

Hobbing tough, hard materials — such as this torsion bar job — presents no special production problems when you use the Engineered Hobbing approach.

These torsion bars, 45-50 Rockwell "C", approach the upper limit of machineability for

hobbing. Structure and toughness of the material caused hob teeth to wear rapidly.

Barber-Colman Hobbing Engineers worked closely with production officials in this plant to produce the desired results on this job. Substantial tool savings, increased tool life, and better production time resulted. Total hob life has increased from approximately 600 to over 1200 ends.

BUILDERS OF PRECISION GFAR

MADE IN

ROCKFORD... MACHINE TOOL SHOPPING CENTER

ILLINOIS, U.S.A.

MacLiney, October, 1974



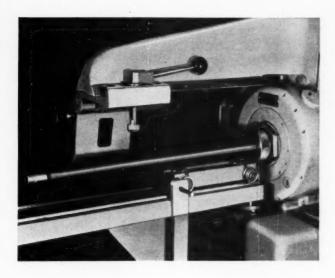
#### TOOL COSTS REDUCED WITH CLASS C ACCURATE UNGROUND HOBS

Barber-Colman engineers recommended 4-thread Class C Accurate Unground Hobs and automatic hob shifting to increase tool life and production in this hard material. Results showed an average increase from 65 to 120 hobbed ends per hob sharpening. The use of unground hobs has reduced tool cost considerably. Cutting time is 5 minutes per end, the length of cut being 1½".

The form on the hob is a 48° 44′ pressure angle serration with a full radius at the top of the tooth. The hob is non-topping. Climb hobbing allows the hob tooth to start its cut in metal which has had no opportunity to be work hardened.



#### COMBINED ENGINEERING OF HOBS, TOOLING AND MACHINES PRODUCES BENEFITS



Results obtained on this hobbing job show the benefits possible when hobs, machines and tooling are combined through proper engineering to meet the specific problems of the job.

New No. 16-16 Hobbing Machines are used, equipped with 30" rear overhanging center bracket. Bars are loaded from the rear of the spindle, where the operator easily pushes them from a conveyor into the spindle. A special steadyrest bracket guides the bar and protects the hob while loading. Work change time is 1½ minutes.

You, too, can simplify your hobbing problems by consulting Barber-Colman engineers. Why not contact them today for an evaluation of your hobbing methods.

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES



#### Barber-Colman Company

GENERAL OFFICES AND PLANT, 620 ROCK STREET. NOCKFORD, ILLINOIS, U.S. Á.

HOBS AND MACHINES SINCE 191



MUI.

ROCKFORD MADE MEANS PRECISION MADE...ROCKFORE

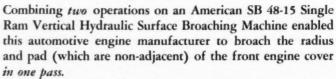
Michigany, October, 1912

ILLINOIS, U.S.A.



#### broached in a single pass

#### .. the AMERICAN way



The tooling for this operation consists of generating type broaches and shaving blades mounted on the main machine slide for broaching the radius and joint surfaces. In addition, a special hardened and ground guide is mounted on the table to guide generating type broaches and shaving blades which are pulled down by adapting the lower end of the holder to the machine slide. These broach the pad thus completing the two operations in one pass.

Automatic clamping, plus an automatic sliding table are two additional features of this American installation that help maintain a production rate of approximately 115 parts per hour at 85% efficiency.



Write for your copy of American's Circular 300.



#### YOU CAN SOLVE YOUR BROACHING PROBLEMS THE AMERICAN WAY

This is only one of thousands of problems solved during American's 25 years of experience in the manufacture of broaching machines, broaches, and broaching fixtures. A part-print or sample and hourly requirements are all it takes to start American engineers working on your problem. Write today!

AMERICAN SECUCION OF SUNDSTRAND MACHINE CO.

ANN ARBOR, MICHIGAN

See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



MADE IN

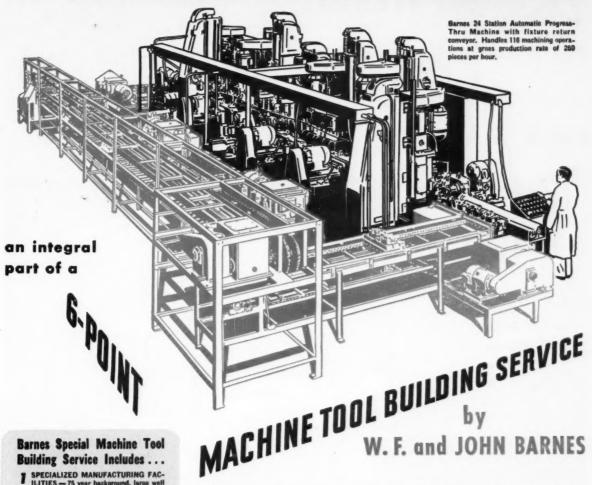
ROCKFORD... FOR ACCURATE, FAST METAL REMOVAL

ILLINOIS, U.S.A.

Uniformly, October, 1997



#### and CONVEYOR EQUIPMENT



- SPECIALIZED MANUFACTURING FAC-ILITIES 75 year background, large well equipped plant efficiently tooled to produce high production machines.
- 2 SPECIAL HYDRAULIC EQUIPMENT designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.
- 3 SPECIAL GAUGES, FIXTURES, TOOLS designed for each individual machin problem, assure accuracy of operations high production speeds.
- 4 SPECIAL ELECTRICAL EQUIPMENT and CONTROLS individually designed and built for maximum safety and ease of control with circuits that assure the most dependable coordination of all mechine functions.
- 5 SPECIAL HANDLING AND CONVEYOR EQUIPMENT as illustrated above.
- COORDINATED DESIGN AND ENGINE-ERING — Mechanical, Hydrautic, Electri-cal, Process, Tool, and Fixture Engineers work together at Barnes. Team-work, solves complex problems quickly.

#### Eliminates Laborious Operations — Increases Output Capacity

Designing and building special work handling and conveyor equipment is today an integral and important part of a 6-point machine tool building service rendered by Barnes. The example shown above illustrates how such equipment helps increase machining efficiency by reducing physical effort. Other components often include work and fixture rotating and lifting devices, air cleaning units, and drag-line or vibrator-type chip conveyors which save time and eliminate many hazardous and laborious operations. Because such equipment is specially designed and built, it simplifies operating problems and helps increase output capacity.

#### Undivided Responsibility Assures Better Service

Because all planning, engineering, and manufacturing efforts at Barnes are closely coordinated, you get a complete machine tool building service all from one convenient, dependable source. Broad, varied engineering experience and creative skills have been developed over the years which enable Barnes to help you solve many troublesome production problems. If your present or future machining needs call for faster, more efficient methods, we will be glad to work with you as rapidly as current conditions will permit.



Write for Full Details Ask for free booklet "Coordinated Machine Engineering," describing the details of Barnes machine tool build-ing service. Illustrates modern machines and mass production techniques.

W. F. & JOHN BARNES COMPANY 310 S. WATER ST., ROCKFORD, ILLINOIS



MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES . AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES



FOR METAL REMOVAL WITH ACCURACY AND SPEED...ROCKFORD

ILLINOIS, U.S.A.

#### Downtime BECOMES

### Production Time

with the

#### **NEW MATTISON DUPLEX**

7ake a look at THIS

2 Operators
2 Standard Grinders
500 Pieces

1 Operator 1 Mattison Duplex 500 Pieces

• That's what happened at The Ingersoll Milling Machine Co., where modern shop equipment is playing an important part in meeting greatly increased requirements for Ingersoll milling cutter blades.

They say "The pieces being ground in these pictures are Maxel steel shanks for carbide-tipped milling cutter blades.

On these particular blade shanks, .050 stock is removed on the Mattison Duplex. A wide variety of blades and shanks are ground on this machine, with stock removal ranging from .020 to .200.

The two Mattison Duplex machines which replaced three single-table standard type grinders are doing more work than the three replaced machines. By placing a single ring of blades around the outside of the 30" diameter chuck, the operator is able to maintain continuous grinding. If more blades were put on the table at one time, the blades on the other table would be finished before he was ready to unload them.

The time saving in rough grinding these blades on the new Duplex machines is 50 per cent, compared with the old machines. In other words, 500 blades can be produced in half the time formerly required. Greater power and faster action account for some of this difference.



The new Mattison Duplex Grinder is really two machines in one, being equipped with two rotary tables or chucks instead of one. On many classes of work, one operator with this machine can turn out as much work as was formerly done by two machines and two operators. See example to the left. Downtime is practically eliminated.

An analysis of your grinding work will very likely disclose many jobs that could be very profitably handled on a Mattison Duplex. For further information write for a free copy of 145-3RM our new circular on this machine.

MATTISON

MACHINE WORKS

ROCKFORD · ILLINOIS

BAADE IN

ROCKFORD...MACHINE TOOL PLANTS CLOSE TO YOUR PLANT

ILLINOIS, U.S.A.

Muchinery, Ortober, 1952





## YOUR BEST BREAK IN COST PER PIECE IS COMBINED OPERATIONS IN A SINGLE SET-UP

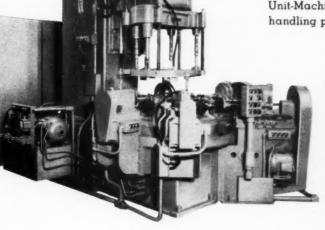
#### USING BARNESDRIL UNIT-MACHINES

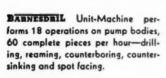
Every time you turn a spindle—or move a work piece it adds to your production cost. That's a good reason for you to combine as many metal-cutting operations as possible.

Bannesdril Engineers will arrange these operations in any desired pattern and production rate, in a single-automatic cycle, to give you lowest possible cost-per-piece. Work transfer-time and individual machine maintenance and downtime are eliminated.

You can process straight-runs of identical pieces, or mix several different pieces at one time, with the same cost and time benefits.

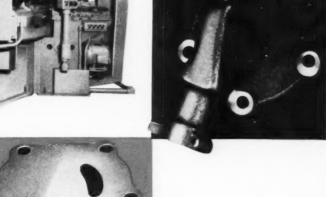
Call a BARNESDRIL Engineer today, and ask him how Unit-Machining will reduce your costs and work-handling problems.







Complete description of Unit sizes and capacities, with work transfer setups. Write for Bulletin B-150.





BARNES DRILL CO.
320 CHESTNUT STREET . ROCKFORD, ILLINOIS

ROCKFORD.

MADE IN

CENTER OF MACHINE TOOL EXCELLENCE...ROCKFORD

Machinery, October, 1952

ILLINOIS, U.S.A.

## Rehnberg-Jacobson

LOAD IT, START IT, AND WALK AWAY ... COME

BACK IN 6 MINUTES

AND YOU HAVE 60

5/16" HOLES DRILLED

AND REAMED

ON A 34 1/2" BOLT

CIRCLE IN A

STEEL PIECE

3/4" THICK ... "

**FOR JETS** 

This little trick is used for putting the 60 bolt holes in a stator blade adjusting spacer for a well-known make of jet engine. An important requirement is that the holes must be equally spaced within .005" of each other. The table has ten positions, as you might guess from the 6-spindle heads. Actually, it makes 14 indexes; on the first two the reamers

don't work, and on the last two the drills hold back—all automatically. The machine is simply constructed of mostly standard elements, openly designed for easy work handling, is easy to operate, and easy on the maintenance crew. Those features are characteristic of Rehnberg-Jacobson machines.

REHNBERG-JACOBSON MFG. COMPANY

DESIGNERS & BUILDERS OF SPECIAL MACHINERY



2135 KISHWAUKEE ST. ROCKFORD, ILLINOIS

MADE IN

CKFORD... FOR MACHINES DESIGNED TO SUIT YOUR PRODUCTION

ILLINOIS, U.S.A.

Barriery Comm. Str.



HANDLE TOUGH JOBS EASILY ROCKFORD HYDRAULIC SLOTTERS



Rackford Hydraulic Slotters are your easiest method of machining large irregular pieces, internal surfaces, and angular or rotary cuts.

Rockford Slotters sharply reduce cutting time on your cumbersome jobs. Setups are quick and simple. Hydraulic cross, circular and longitudinal feeds give you maximum slotter flexibility. And Hydraulic drive supplies constant speed, simply selected.

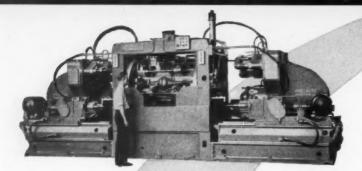
Ask a Rockford Machine Tooi Co. representative to recommend the Rockford

ROCKFORD MACHINE TOOL CO. 2500 KISHWAUKEE STREET . ROCKFORD, ILLINOIS



YOU'LL FIND YOUR PRODUCTION MACHINE TOOLS IN...ROCKFORD

ILLINOIS, U.S.A.



#### **BUILDERS OF** SPECIAL MACHINERY **SINCE 1918**

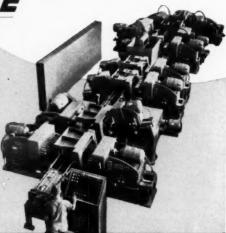




'Way back in 1918, the first Greenlee Special Machine went into operation in the tractor plant of a now famous automobile manufacturer (who still makes tractors). We've made a lot of machines since then, from small, special purpose machines performing only a few operations to huge transfer machines employing several hundred tools working in automatic, unvarying cycles. We're still making special machines . . . and constantly developing new methods for faster, cheaper production processes. for faster, cheaper production processes.

> GREENLEE BROS. & CO., 1870 MASON AVE., ROCKFORD, ILL.





MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES . AUTOMATIC SCREW MACHINES . AUTOMATIC TRANSFER PROCESSING MACHINES

MADE IN

OCKFORD... A CONVENIENT SOURCE FOR PRODUCTION NEEDS

ILLINOIS, U.S.A.

Machinery, October, 1952



SMOOTH INDEXING AND FAST, ACCURATE PRODUCTION OBTAINED WITH

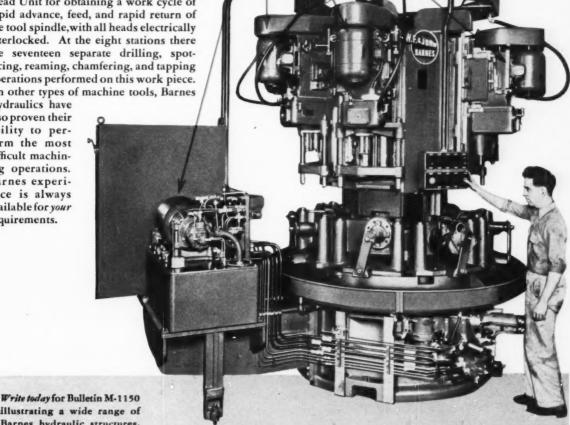


## BARNES HYDRAULICS

Two types of Barnes Hydraulics are used on this multiple-operation machine for production of transmission cases. (1) At the left is a Barnes Hydraulic Fixture Unit for indexing a large rotary table and inserting the locating pin. (2) Each station has a Barnes Hydraulic Sliding Head Unit for obtaining a work cycle of rapid advance, feed, and rapid return of the tool spindle, with all heads electrically interlocked. At the eight stations there are seventeen separate drilling, spotfacing, reaming, chamfering, and tapping operations performed on this work piece. On other types of machine tools, Barnes

Hydraulics have also proven their ability to perform the most difficult machining operations. Barnes experience is always available for your requirements.

ON A/W. F. & JOHN BARNES CENTER COLUMN MACHINE



illustrating a wide range of Barnes hydraulic structures.

JOHN S. BARNES CORPORATION 305 SO. WATER ST., ROCKFORD, ILL.

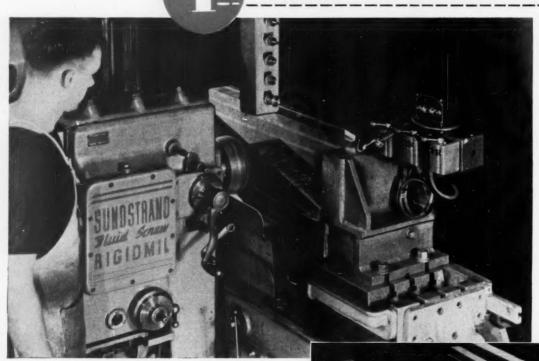


FOR PRODUCTION MACHINE TOOLS IT'S...ROCK

Michigany, October, 1952

ILLINOIS, U.S.A.

# How to use **Sundstrand**"Engineered Production" and Equipment for... Small Lot Milling



Here's an excellent combination for increasing production and cutting costs on miscellaneous milling. It consists of a Sundstrand Model 33 Rigidmil equipped with a Sundstrand Magnetic Fixture. Parts machined include tool blocks, cam bars, tool slides, motor brackets, etc. Lot sizes vary from 1 to 25 pieces, and time reduction averages 50% over former method. In addition to saving time through the elimination

of mechanical clamps, these magnetic fixtures save the costs

of special jigs or fixtures. Install a combination like this and you'll be surprised at the number of different parts you'll be able to mill faster and better. Call in a Sundstrand methods engineer. He'll be glad to help you.



RIGIDMILS

AUTOMATIC LATHES

HYDRAULIC EQUIPMENT

MADE IN

ROCKFORD... CITY OF MACHINE TOOL SPECIALISTS

ILLINOIS, U.S.A.

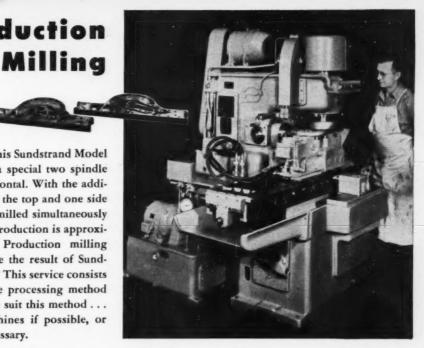
Part Colonia C



## Production

Here's an entirely different approach to a milling problem. This Sundstrand Model 22 Rigidmil is equipped with a special two spindle head, one vertical and one horizontal. With the addition of the vertical spindle, both the top and one side of these aluminum castings are milled simultaneously in one automatic cycle. Rate of production is approximately 50 flanges per hour. Production milling problem solutions like these are the result of Sundstrand "Engineered Production." This service consists of designing the most profitable processing method first, then obtaining machines to suit this method . . . standard or semi-standard machines if possible, or

entirely special machines, if necessary.



#### **Special Machining at High Production**



Here's a good example of a special machine designed to perform basic milling operations and

including drilling and counterboring operations. It is a special 5 station process machine that completes these operations on exhaust manifolds with one handling of the part. All operations are performed at the rate of 113 manifolds per hour.

#### FREE additional data

For complete information on Sund-strand "Engineered Production" including specific tooling and production data, write for Bulletin No. 602. For more information on Sundstrand Magnetic Fixtures, ask for Bulletin No. 624.



SUNDSTRAND

SUNDSTRAND

**Machine Tool Company** 

2530 Eleventh St. Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES



YOU'LL FIND YOUR PRODUCTION MACHINE TOOLS IN ... ROCKFORD

ILLINOIS, U.S.A.

#### RESULTS OF BRIGHT, SCALE-FREE WORK THE "IPSENWAY"



1. CLUTCH PRESSURE PLATE Carbonitrided, 300 per heat, to case depth of .005" - .007" in cycle time of 60 minutes.



2. BREATHER VALVE GEAR Carbonitrided, 250 pieces per heat, to case depth of .010"-.012" in cycle time of 95 minutes.



FENDER HINGE SEGMENT Carbonitrided, 750 pieces per heat, to case depth of .010"-



4. ROLLER TAPPET ASSEMBLY Carbonitrided, 800 pieces per heat, file hard case, in cycle time

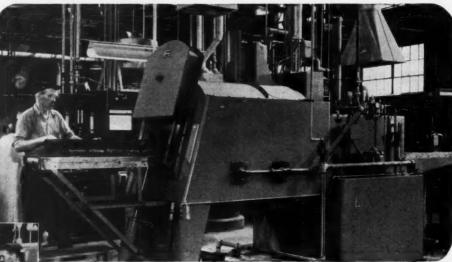
#### PRODUCTION SHORT-CUTS in Heat Treating

View of Ipsen T-250 Unit in operation at Harley-Davidson. Loading door is hydraulically operated by foot pedal. Trays are transferred from heat through intermediate door into quench or cooling chamber automatically.

Unloading view showing parts after oil quenching operation.

Oil is automatically circulated and temperature controlled, assuring uniform cooling

throughout load.



#### with an IPSEN Standard UTOMATIC HEAT TREATING UNIT

Illustrated above are typical heat treating results obtained by Harley-Davidson Motor Co., Milwaukee, in processing parts automatically in a standard Ipsen Heat Treating and Quenching Unit. Individual methods are applied for each part to suit material and depth of hardness desired. The operation in the Ipsen is automatically controlled from heat through quench (or cooling) so that highly uniform, dependable results are obtained from batch to batch.

#### Acid Cleaning and Extra Handling Eliminated

Because each load is heat-treated at a uniform temperature and in a controlled and sealed atmosphere condition, the work comes out bright and scale-free. This, in turn, eliminates acid cleaning operations and extra handling. In addition, clean working conditions prevail, and unskilled operators can be quickly and easily trained to tend several units simultaneously. Investigate this modern, simplified method of heat treating today.



#### Write TODAY FOR MORE FACTS

Ask for free bulletins and find out how Ipsen Units can be applied to your work. If you wish, samples of your work will be run, procedures established, and production estimates made without obligation.



IPSEN INDUSTRIES, INC., 717 South Main Street, Rockford, Illinois Production units for CARBONITRIDING . CARBURIZING . HARDENING . BRAZING . MARTEMPERING

ORD... A CONVENIENT SOURCE FOR PRODUCTION NEEDS



## NORTON

## ... More Products for Better Grinding ... More Grinding for Lower Cost

From heaviest stock removal to the most delicate precision finishing — and everything in between — there's a Norton abrasive product that's exactly right for you.

Norton wheels, each within its own particular job range, will give you the cool, free cutting action, the uniform rate of wear and long service life that add up to better grinding at lower cost. For over 50 years Norton wheels have been giving onthe-job proof of top quality and top performance — and their proving ground is all industry. And that means every Norton abrasive product—segments, bricks, sticks, mound wheels and points, polishing grain and tumbling abrasive as well as grinding wheels.

See your Norton Distributor for the abrasive products—and the service—that will save you money.



NORTON

Making better products to make other products better

You're sure of finding exactly
the abrasive products
for your jobs in the world's
most complete line,

OCCUUSE...

## NORTON OFFERS YOU POSSIBLE GRINDING



O.D. Grinding — A sure way to protect your big investment in O.D. grinding machines is with Norton wheels. You can get them in the abrasives, grain sizes and bonds for best results on every material that is ground on cylindrical, centerless or roll grinders — wheels that will really cut costs.

#### **Know-how Booklets For Better Grinding**

Norton fact-filled, easy-to-read, illustrated booklets cover every phase of grinding, including the proper selection and care of wheels. Ask your Norton Distributor for booklets on the particular types of grinding in which you are interested—or write direct.



Mounted Wheels and Points — Your operators will like the smooth-as-silk cutting action of Norton mounted wheels and points; so will those small portable grinders of yours. No bounce, no vibration at high speeds. Factory-trued on their own spindles and free from "mold skin," they require no breaking in.

Polishing and Lapping — For every metal polishing job you do, from roughing to finishing, you can get ALUNDUM grain in the right surface treatment and grain size — including super-fine sizes for lapping. And there's also NORBIDE grain—hardest material made by man—for lapping carbide tools and dies.





Internal Grinding — No other type of grinding machine depends so much on grinding wheel uniformity as the internal grinder. That's why Norton New-Process wheels will prove valuable production-aids in your own internal grinding. Being identical in grinding action they can be changed without machine adjustments — and they'll deliver top performance.



Tool and Cutter Grinding — Norton New-Process wheels bring you structural and dimensional uniformity never before achieved. That means identical performance by each wheel and longer, more even wheel wear. On carbon and alloy steels use 32 ALUNDUM\* abrasive, especially developed to take heavier cuts faster; on cemented carbides use CRYSTO-LON\* grinding wheels in the new K bond.

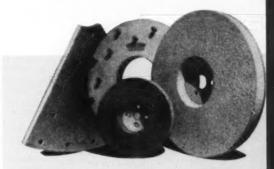


Surface Grinding — You get real cost-cutting performance with wheels, cylinders and segments of Norton ALUNDUM and CRYSTOLON abrasives. 32 ALUNDUM abrasive is unbeatable for fast, cool cutting action on all steels, while CRYSTOLON abrasive is ideal for gray iron and the non-ferrous metals.

## OVER 500,000 COMBINATIONS!



Rough Grinding — On your portable grinders, Norton wheels "hug that work," to cut time and costs. On your swing frames or floor stands they grind off more metal per dollar. And NORTON REINFORCED Hub Wheels — rigid and semi-flexible types — are the safest, most efficient, most versatile ever mede.



Disc Grinding—Count on Norton discs to grind your flat surfaces straight and smooth, with no excess heat to cause warpage. They're great production boosters, with minimum down time. Available in sizes, types and mountings for all makes of disc grinders.

Cutting-Off — What do your cutting-off jobs call for? Wet or dry cutting? High or low speeds? Are your cut-off wheels important factors in keeping up volume production? Whatever your requirements, you'll find your money-saving answers in the complete Norton line of cut-off wheels.



**Barrel-Finishing** — You get real precision-finishing with ALUNDUM tumbling abrasive. Being all aluminum oxide it cuts without glazing, is hard and tough for long, productive service. There's a grit size for every type of barrel equipment, for every application on stampings, forgings and castings.



...and bere's bow
you can be SURE of
getting the grinding
combinations
that are exactly
right for YOU



#### Your Norton Distributor Is The Man To See -

One reason why he is your Norton Distributor is because he knows abrasives. He has had plenty of practical experience with grinding applications — can give you sound, down-to-earth advice on the types, sizes and shapes of wheels you need for the jobs you're doing right now.

#### He Can Call In Norton Technicians -

But, broad as his knowledge is, you don't have to depend on that alone. If your grinding requirements are unusual, he can always call in a Norton Abrasive Engineer for quick consultation. You can bank on it that your problems won't go unsolved.

#### He Gets Around -

Remember, also, that your Norton Distributor is in constant contact with the latest developments in machining. He knows tools and tool performance. Moreover, Norton keeps him supplied with information on the newest grinding techniques — information he's always ready to pass on to you.

#### His Service Is Quick And Thorough -

Naturally, his stock of Norton abrasive products is more than ample for the everyday requirements of his territory. But if need be, he can quickly get any items from the nearest Norton warehouse or the Worcester stockrooms. Your hurry call to him will get quick action.

Those are just some of the advantages that make your Norton Distributor the vital connecting link between you and the whole Norton organization — the world's largest manufacturers of abrasives and the leaders in research and development.

So, for better, easier, lower-cost grinding on every job — get in touch with your Norton Distributor! He is listed under Grinding Wheels in your classified telephone directory. . . . NORTON COMPANY, Worcester 6, Mass. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Behr-Manning Corporation, Division of Norton Company, Troy, New York, makes abrasive paper and cloth, oilstones, abrasive specialties, Behr-Cat brand pressure-sensitive tapes.



Making better products to make other products better

WHAT'S THE FASTEST WAY TO CLEAN METAL? See page 11 WHAT'S THE MOST ECONOMICAL WAY? See page 9

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"Some good things to know about Metal Cleaning"

answers many questions that mean better production, more profit for you. Just look at the table of contents:

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Pickling, deaxidizing, bright dipping Pre-paint treatment in machines, in tunks and by hand Paint-stripping Steam-detergent cleaning Barrel cleaning Burnishing

Metal Cleaning

Better cleaning in hard-water great Treating water in paint spray beaths Rust prevention Machining and grinding

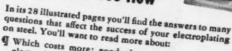
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HAVE YOU TAKEN THE FOUR GOOD STEPS? See page 5 > >

#### This FREE Booklet Tells You How



Which costs more: good electrocleaning or poor

How can cleaning costs be reduced 33 % while plating quality is being improved? See pages 7 and 8.

What are four easy ways to improve the average rinse

What rinsing fault is "an invitation to trouble" in the plating of high-carbon steel? See page 11.

Why is it better to clean steel with reverse current than with direct current? See pages 12 to 14.

g What causes hydrogen embrittlement during electrocleaning? What is the remedy? See pages 15 and 16.

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answers many questions that will lead you to better stripping procedures. You'll want to read more about:

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What's best when steam is not available? See page 7. What is the cheapest way to strip metal parts in large

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What strippers are best for removing oil-base paints? ... Synthetic enamels, alkali-resistant plastics or resinbased paints?... Japans, wrinkle finishes, nitrocellulose lacquers, alkyds, phenolics and ureas? See page 12.

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Send me a FREE copy of "How to STRIP PAINT"
ALSO tell me about Oakite methods for removing the following soils:
<ul> <li>□ buffing compound residues</li> <li>□ pigmented drawing compounds</li> <li>□ oils and greases</li> </ul>
rust, oxides heat scale flux residues carbon smuts tarnish rust preventives
other soils

## the MS Execification

The customers' interests shall be considered and safeguarded at all times and under all conditions. Even in unforescen emergencies that may complicate this transaction, the vendor shall employ his abilities and resourcefulness so as to insure satisfaction and benefit to the customer."



Nobody ever saw such a stipulation in any specification but the spirit of it automatically becomes part of every order received by Bunting Brass & Bronze Company. Ask any Bunting customer.



THE BUNTING BRASS & BRONZE COMPANY . TOLEDO 1, OHIO . BRANCHES IN PRINCIPAL CITIES

## "Tool Steel Topics



BETHLEHEM

#### CARBON TOOL STEEL— Toolmakers' First Choice

So many tool steels have been developed for special applications that some people overlook the many uses for earbon tool steels. Actually they're used in larger quantities than any other type of tool steel. An experienced toolmaker usually considers them first, recognizing that they are the logical steels for a starting point.

Here's why carbon tool steels are so popular:

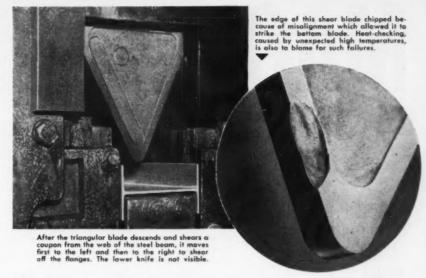
- Easiest to machine of all tool steels
- · Easy to heat-treat
- High surface hardness reinforced by a tough core
- They develop keen cutting edges

Hand chisels, center punches, and various shock tools are usually made from earbon tool steel having a carbon content of from 0.75 to 0.85 pet. Other ranges of carbon content: 0.90 to 1.00 for coldheading dies; 1.00 to 1.10 for general-purpose tools and dies (this is the most frequently used analysis); and 1.15 to 1.25 carbon for stone-dressing tools, drawing dies, etc. Our carbon-vanadium steels, containing an addition of 0.15 to 0.25 pet vanadium, have similar applications in many instances.

The controlled hardenability and spheroidized structure of all Bethlehem carbon and carbon-vanadium grades assure uniform response in heat-treatment. Our extensive metallurgical research has established the ideal degree of hardenability for a wide range of applications. Your nearest Bethlehem distributor and our mill depot are at your service when you need top-quality carbon tool steel.



It's easy to machine this chamfering tool holder because all Bethlehem carbon tool steels are carefully spheroidize-annealed to provide a structure that's ideal for easy machining, easy heat-treatment.



#### When cold cuts make hot blades

The shear blades usually lasted about one week in a fabricating shop where steel beams and channels were cut in large quantities. Bad spalls on the cutting edges made it necessary to change blades about once a week, and it was taken for granted that little could be done to make them last longer.

One of our metallurgical men learned of this while in the shop on another job. He began to investigate and soon found that the "cold" cutting was generating about 700 F on the blades. This caused the tool steel to develop heat-checks. In addition, the blade was overloaded due

to poor alignment which allowed it to strike the bottom blade. The combination of heat and overload explained the poor service life.

The solution: Hot-Work 8, one of our hot-work steels, was tried. It's an 8-pet molybdenum analysis that's tops in wear-resistance when operating temperatures are high. Tempered at 750 F, the first blade made a total of 45,000 cuts. The best previous record was 7,700 cuts.

Here's another instance of how the practical experience of our metallurgical contact men helps to put the finger on tool steel troubles.



#### BETHLEHEM TOOL STEEL ENGINEER SAYS: Heat-treat the tool, not the thermocouple

Improper temperatures during heattreating frequently cause tool failures. In many instances the thermocouple chart shows proper heat-treatment temperatures, but the microstructure of the tool proves that the temperatures recorded were not attained by the tool. This is known as "heat-treating the thermocouple instead of the tool."

Most furnaces show some non-uniformity of temperature — locations near the source of heat are hotter than remote locations and the bottom tends to be colder than the top. A survey of each furnace will reveal the temperature differ-

ences which are present. This information makes it possible for the operator to select the location which will indicate most accurately the temperature of tools heated in the furnace; quite often the need for more than one thermocouple is apparent.

A thermocouple indicates the temperature of its tip only, so it's good practice to place the tip of the thermocouple as near to the tools as possible. Locations near the floor, sides, roof, or near the source of heat should be avoided. The thermocouple is an accurate and highly useful device, but it's not foolproof.

Parts go from print to plug gauge...fast
...with this better-than-ever steel bar

## MACHINABILITY

 When parts go from print to plug gauge in the shortest possible time... then you know you've got steel bar MACHINABILITY.

With your automatics humming on production set-ups, bar stock has got to deliver.

That's why you'll hear that same familiar hum in famous Union Drawn machining laboratories, too. Production parts are running—on test. Parts that are designed to utilize all common operations of modern six-spindle automatics. Not just two or three or four . . . but all! Testing MACHINABILITY for you!

Research has established Union Drawn as "MACHINABILITY Headquarters." Research that includes years of actual production-line experience in customers' plants... observing, studying, analyzing and reporting every single fact relating to steel MACHINABILITY.

No wonder today's Union Cold Finished Steels consistently give you top ratings on feeds and speeds . . . long tool life . . . freedom from abrasive elements . . . high production rates . . . low unit parts cost.

Need help on set-ups, tooling, or any other phase of machining steel? . . . on cyaniding, carburizing, or other form of surface treatment after machining? You'll get it promptly from "MACHINABILITY Headquarters." Just contact your Republic District Sales Office, your Union Drawn Distributor, or write:

#### REPUBLIC STEEL CORPORATION

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#### Quick Facts, For You

They're in your Union Drawn "Pocket Library." Six handy booklets, packed with facts, informative, interesting. Write for your free copies, today.





#### FOR STILL HIGHER PRODUCTION RATES

Ask your Union Drawn field man about the new, fast-machining grade, B-1113X. Where your equipment and parts design are such that heavier feeds and faster speeds are practical, "X" steel may help boost production still higher.



MACHINERY, October, 1952-101



#### They're So Easy to Machine!

For a circular steel blank, the machine shop is the first real test. Can it be rough-cut easily? Finished up smoothly and fast? Or will it cause the machinist all sorts of trouble?

Naturally, much depends on what's inside the blank. If it's a Bethlehem circular forging, it's solid metal all the way through. Your machinist will always be cutting in firm, homogeneous steel. No danger of running into flaws after costly preliminary cuts have been taken.

You might ask, "How can we be sure? How are these blanks different from any others?"

First of all, they're made from steel selected with extra care. Second, they're made by a special, exclusive process that forges the steel and rolls it too — thereby insuring compactness of metal, uniform density, and just the right grain structure.

Use these blanks in making gears, crane and sheave wheels, brake wheels, tire molds, turbine rotors, flywheels, and many other heavy-duty products. They range in size from approximately 10 to 42 in. OD, and are available untreated or heat-treated. Booklet 216, sent free upon request, will give you the full story.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation





BETHLEHEM ROLLED-AND-FORGED CIRCULAR PRODUCTS



#### Chase® Free-Cutting Brass is readily cleared

For heavy feeds and high cutting speeds you can't beat Chase Free-Cutting Brass rod and bar. Chips from these Chase copper alloy products are short and brittle and are readily cleared from the cutting tools even during rapid and intricate cutting operations. That means longer production runs and longer life for your tools.

Write today for a copy of our book "Free-Cutting Brass - Bronze - Copper".

#### Chase

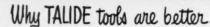


FREE Chase 56-Page Book gives valuable data on free-cutting wrought copper alloys, their selection and use.

Chase Brass & Copper Co., Dept. MACH. 1052 Waterbury 20, Conn. Please send me free book "Chase Free-Cutting Brass Bronze - Copper". Name







81 ROCKWELL "C" HARDNESS

(hardest steel—68 "C") of talide tip cuts toughest metals—at highest speeds.

275,000 p.s.i. TRANSVERSE RUPTURE STRENGTH

takes heaviest cuts and feeds—withstands shock and abuse.

INDUCTION-BRAZED to insure strongest bond between tip and shank. 2 MICRO-INCH FINISH is diamond lapped—holds keen edge longer.

DENSITY OF 14.75 GMS/cc

(steel = 8.60) assures uniform structure and freedom from porosity.

EXTRA RIGID SHANK of cold-drawn high-carbon steel is tough, stiff and strong.



• It is not necessary to purchase expensive new machine tools, or wait long periods for delivery. Many plants are finding that one lathe—properly tooled up with Talide tools—out performs three lathes set up with conventional steel tools.

You know the advantages of carbide tools, but have you ever actually tried Talide tools on your own machines? You can quickly see how much faster you can cut and machine, how many more pounds per grind you can remove with Talide tools. The edges stay sharper longer, eliminating much of the usual redressing and down time. These advantages add up to the one big advantage of long production runs and low unit cost.

Try Talide tools and see for yourself how you can stepup your production. Talide tools are stocked in 166 standard sizes and 6 standard grades. Industry-wide numbering system assures quick identification and makes ordering easy. Ask for Catalog 50-G.



HOT PRESSED CARBIDES SINTERED CARBIDES . CUTTING TOOLS . DRAWING DIES . WEAR RESISTANT PARTS

25 YEARS EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

& MAL WORK ROLLS





we won our first letter in tool steel

We all remember with pride our first triumphs. Ours was with tool steel. And after a half-century, Crucible is still the nation's top

Therefore, we are keeping our research and development right in step with industry's progress. We are making our experience available to you, with freely offered metallurgical advice. And we provide quick delivery from a fully-stocked warehouse located near you.

SEND TODAY for the unique Crucible Tool Steel Selector-a twist of the dial gives the tool steel for your application.

Rex® High Speed Steels Peerless Hot Work Steels Halcomb 218 Chro-Mow® Sanderson Carbon Tool Steels AirKool Die Steel Airdi® 150 Nu-Die V Die Casting Steel CSM 2 Mold Steel La Belle® Silicon #2 Atha Pneu

**SPECIFY** YOUR TOOL STEELS THESE **BRAND NAMES** 

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Name			1
Company		Title	M.
Address	City	State	9" diameter, 3-colors

CRUCIBLE first name in special purpose steels

52 years of Fine steelmaking

CRUCIBLE STEEL COMPANY OF AMERICA . TOOL STEEL SALES . SYRACUSE, N. Y.

MACHINERY, October, 1952-105

#### MBERLAND GROUND BARS

We manufacture 8" diameter, 7-1/2", 7", 6-1/2", 6", and also odd and intermediate sizes down to and including 1-1/8".



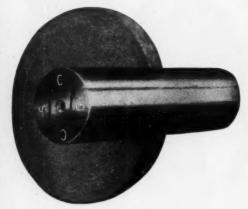
ON THE WEST VIRGINIA SHORE, OVERLOOKING THE POTOMAC RIVER, STANDS THE JAMES RUMSEY MONUMENT

> The first practical steamboat in the world was run on the Potomac River a few miles below Cumberland, Maryland.

> George Washington said in his diary, under date of September 6, 1784: "Remained at Bath all day and was showed the Model of a boat constructed by the ingenious Mr. Rumsey, for ascending rapid currents by mechanism; the principles of this were not only shown, and fully explained to me, but to my very great satisfaction, exhibited in practice in private under the injunction of

> At a later date George Washington said in his diary: "Spent the afternoon with Mr. Rumsey and then Alexander Hamilton and I rode on to Cumberland, Maryland.'

CUMBERLAND STEEL COMPANY



#### **Symbol of Quality**

Approximately 100 years after the exhibit of this steamboat, Cumberland began grinding bars. They found through experience this was the best method by which accurate steel bars could be produced. These bars are so carefully ground that they are adapted for mass production where gears, pulleys, sprockets and bearings must slide on the bars without delay due to filing or fitting.

#### IMMEDIATE BARS

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Worcester, Mass.— Pratt & Imman

CUMBERLAND, MARYLAND, U. S. A. ESTABLISHED 1845 INCORPORATED 1892



Now... you can join tubing or pipe without threading, flaring, sweat-soldering, brazing or welding. Simply use "Quikupl"... the completely new... completely tested stainless steel fitting.

"Quikupl" cuts labor and installation time. Lines already installed show time and labor can be reduced 40 to 50%—or more. Tubing or pipe is simply cut to length, deburred and inserted into the fitting. Tightening a small screw completes the coupling. A resilient sealing ring...nontoxic to foods, and resistant to most chemicals... provides initial squeeze fit between fitting and tube or pipe. The higher the pressure, the better the sealing effect.

"Quikupl" is a money saver. You can use Schedule 5, the lightest pipe made—or tubing with even a lighter wall. You pay less per foot because you buy only the wall thickness needed to do the job.

"Quikupl" couplings, tees, adapters and elbows (45° and 90°) are available from Frasse warehouse stock in Types 304 and 316 Stainless Steel—tube and pipe sizes range from 1" O.D. to 4" O.D.

Facts about "Quikupl" fittings and how you can save with them are outlined in Frasse Engineering Memorandum #7. Send for your copy today.

pressure, the better the sealing effect.	Bars · Sheets · Strip · Plates · Wire Tubing · Pipe · Valves · Fittings
*	New York 13, N. Y.  Gentlemen: Please send me your Engineering Memorandum #7  containing complete facts about "Quikupl" stainless steel fittings.
Peter A. FRASSE and Co., Inc.	NameTitle
New York 13. N. Y. Philadelphia 29, Pa. Buttalo 3, N. Y. Syracuse 1, N. Y. 17 Grand St. 3911 Wissahickon Ave. 50 Exchange St. P. O. Box 1267 Walker 5-2200 Baldwin 9-9900 Washington 2000 Syracuse 73-5241	Firm
Lyndhurst • Hartford • Rochester • Baltimore	V Address.

Free-Machining ENDURO gives you-

## CORROSION-RESISTANCE or STAINLESS STEEL



us High Machinability



Full color 16mm sound film 27 minutes running time

27 minutes running time
The dramatic story of the discovery of
stainless steel ... how early production problems were solved ... how
the long-lasting metal grew to its
present-day importance. Republic
steel's new milited groups, without
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date, to: Ideal Picture Corp.. 65 East
South Water Street, Chicago I, Ill.;
or write Republic Steel, Dept, K,
Cleveland I, Ohio.

For every application in which you need top resistance to corrosion-plus the high MACHINABILITY necessary to apply this corrosionresistance most economically-investigate Republic Enduro Stainless Steel ... in cold finished or hot rolled bars, and in wire.

Free-Machining ENDURO bars are cold finished by Republic's Union Drawn Steel Division to provide close tolerances, accuracy of section, uniform soundness and fine surface finish . . . plus the high physical and chemical properties of stainless steel. Two grades are fully 90% as machinable as Bessemer screw stock!

Republic metallurgists are ready now to give you prompt assistance on Free-Machining ENDURO Stainless Steel bar applications, processing and use. Contact them through your nearest Republic District Sales Office, or write:

#### REPUBLIC STEEL CORPORATION

Alloy Steel Division . Massillon, Ohio GENERAL OFFICES . CLEVELAND 1, OHIO Export Department: Chrysler Building, New York 17, N.Y.

Republic ENDU SIMINIESS SIEEL

Other Republic Products include Carbon and Alloy Steels - Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing



## Aluminum screw machine parts take all finishes

Add to low cost and ease of machining another advantage of aluminum screw machine stock . . . better finishes. Fittings and fasteners are often anodized to increase their resistance to corrosion and abrasion. Component parts for appliances are frequently plated for high luster and better match with other parts. Burnishing is usually sed for bulk finishing of small parts such as smoking pipe parts. finishes can be applied to aluminum by most mechanical and chemical processes. Aluminum can be painted and electroplated using standard equipment and procedures. And, of course, it can be anodized to any color of the rainbow.

Your local Alcoa sales engineer will answer your questions on finishing and machining procedures. You'll find him listed under "aluminum" in your classified phone book.

> ALUMINUM COMPANY OF AMERICA 870-K Gulf Building · Pittsburgh 19, Pennsylvania



#### **ALCOA OFFERS TWO BOOKS**

Alcoa Aluminum in Automatic Screw Machines—a 95-page book containing information on tool design, setup and operating techniques.

Corrected Tool Diameter Tables—a 64-page book giving corrected tool diameters for circular form tools and flat form tools under conditions of 0°, 5° and 10° top rake.





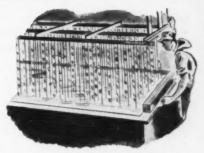
"SEE IT NOW" with Edward R. Murrow-CBS-TV every Sunday . . . brings the world to your armchair. Consult your newspaper for local time and channel.

ALCOA



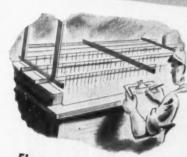
**ALUMINUM SCREW MACHINE STOCK** 





#### Chemical and **Electrochemical Finishes**

... frosted, etched and anodized for unusual effects in color—for extra corrosion resistance—for better paint adhesion.



## **Electroplated Finishes**

... chromium, copper, nickel, gold, silver and brass.

# A WEEK'S FINISHING DONE IN A DAY

HAYNES STELLITE alloy milling cutter blades recently solved a tough finishing problem in the production of cast iron mold jackets. Face-milling operations with harder tool materials failed because of chipping and spalling of the cutter blades after finishing only a few castings. Then the foundry tried grinding the jackets. But this was too slow; it took at least 30 minutes to grind each one.

A switch to HAYNES STELLITE Star J-Metal blades cut finishing time to a mere six minutes per casting. An extra saving results from the long life of the HAYNES STELLITE alloy blades. They produce about 350 pieces per grind.

HAYNES STELLITE alloy tools are ideal for cast iron milling jobs because of their high compressive strength at cutting temperatures, good impact strength, and extremely low coefficient of friction. Contact our nearest District Office for on-the-job help with your machining problems, or write for the new manual, "HAYNES STELLITE Metal-Cutting Tools."



This 12-in. diameter cutter, containing 32 HAYNES STELLITE alloy inserted blades, removes 1/16-in. of stock from cast iron mold jackets. A 36-in. casting is milled with this setup in about 1/5 the time required for grinding.



### Haynes Stellite Company

A Division of Union Carbide and Carbon Corporation

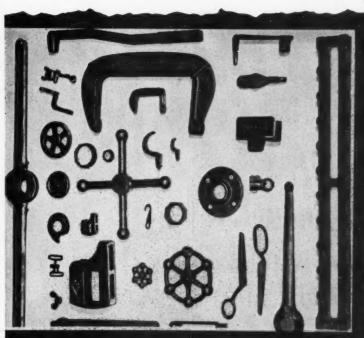
General Offices and Works, Kokomo, Indiana Sales Offices

Chicago — Clevaland — Detroit — Houston
Los Angeles—New York—SLA Francisco—Tulsa

"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation

## PRODUCT AND PROCESS ADVANTAGES

## increase demands for Ductile Iron



COURTESY OF ACME SHEAR COMPANY, BRIDGEPORT 1, CONN.

Ductile Iron offers excellent castability, high mechanical properties and good machinability. Castings show superior pressure tightness, good elastic modulus and resistance to shock. They range from those weighing a few ounces . . . with sections as thin as one-tenth of an inch . . . to 50-ton anvil blocks with sections 4' thick.

THE INTERNATIONAL NICKEL COMPANY, INC.

DUCTILE IRON PROVIDES mechanical properties which approach those of cast steel. In addition, it combines the machinability and wear-resistance as well as the fluidity and castability of cast iron.

Presence of spheroidal rather than flake graphite not only gives this new material ductility that is unique among cast irons, but contributes much to its other exceptional properties.

#### REMARKABLE CHARACTERISTICS OF DUCTILE IRON

- Its elastic modulus, about 25,000,000 psi, is virtually unaffected by composition or thickness...
- It can provide a chilled, carbidic, abrasionresistant surface supported by a tough ductile core.
- 3. As-cast ductile iron of 93,000 psi tensile strength has the same machinability rating as gray iron with a strength of 45,000 psi.
  - 4. Annealed ductile iron can be machined at a rate 2 to 3 times that of good quality gray iron.
  - 5. It can be satisfactorily welded.
  - It resists oxidation and growth to an extent never before available in gray iron castings.
  - 7. It can be cast in intricate shapes not normally feasible for cast steel.

#### AVAILABILITY

Send us details of your prospective uses, so that we may offer a list of sources from some 100 authorized foundries now producing ductile cast iron under patent licenses. Request a list of available publications on ductile iron...mail the coupon now.



The International Nickel Company, Inc. Dept. 20, 67 Wall Street New York 5, N.Y.

Please send me a list of publications on:

Name\_\_\_\_\_Title\_\_\_\_\_
Company

Address\_\_\_\_\_\_
City\_\_\_State

MACHINERY, October, 1952-111



Jigs and Fixtures
that are easier to
handle increase
production. Alcoa
Cast Aluminum
Tool and Jig Plate
is lighter...easier
to machine. And
is available for
immediate delivery\*

- **►** Moderately Priced
- **►** Easy to Machine
- ► Normalized...Strain Relieved
- ► Tolerances on Plates of thicknesses from 1/2" to 4", held within ±.010"
- ► Widths and lengths: cut to any desired dimensions up to 48"x 96"

\*\* For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office...or Aluminum Company of America, 1951-KGulf Bldg., Pittsburgh, Pa.

ALCOA



TOOL AND JIG PLATE

# 400% PRODUCTION **INCREASE!** that's GOOD NEWS at NEWM

A new GRAY 48" x 48" x 16' Milling Machine is on the job. GRAY's unit head versatility, great operating convenience, and high precision performance slashed milling time to 1/4 . . . increased production 400%.

Further proof that a GRAY in your shop will look just as good

GRAY is paying off at Newman Machine Co., Inc., Greensboro, N. C.

to your Treasurer as to your Superintendent.

Write today • get the story on HIGH tow cost PRODUCTION

The G.A. GRAY Company

planers \* milling planers planer type milling machines herizental bering machines

CINCINNATI 7, OHIO, U. S. A.

SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. . SOLD IN LATIN AMERICA BY MACHINE APPILIATES



- ► Moderately Priced
- **►** Easy to Machine
- ► Normalized...Strai
- ► Tolerances on Plate from 1/2" to 4", held w
- ► Widths and lengths dimensions up to 48".

\*\* For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office...or Aluminum Company of America, 1951-KGulf Bldg., Pittsburgh, Pa.

# PAC

ALCOA



TOOL AND JIG PLATE

112-Machinery, October, 1952

# GES



o., Inc., Greensboro, N. C.
on the job. GRAY's unit
nience, and high precision performance
... increased production 400%.
op will look just as good
uperintendent.

The G.A. GRAY Company

planers \* milling planers

planer type milling machine
horizontal boring machines

CINCINNATI 7, ONIO, U. S. A

SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. . SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

MACHINERY, October, 1952-117



Jigs and Fixtures that are easier to handle increase production. Alcoa Cast Aluminum Tool and Jig Plate is lighter...easier to machine. And is available for immediate delivery\*

- **►** Moderately Priced
- **►** Easy to Machine
- ► Normalized...Strain Relieved
- ► Tolerances on Plates of thicknesses from 1/2" to 4", held within ±.010"
- ► Widths and lengths: cut to any desired dimensions up to 48" x 96"

\*\* For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office...or Aluminum Company of America, 1951-KGulf Bldg., Pittsburgh, Pa.

ALCOA



TOOL AND JIG PLATE

# 400% PRODUCTION **INCREASE!** that's GOOD NEWS at NEW

GRAY is paying off at Newman Machine Co., Inc., Greensboro, N. C.

A new GRAY 48" x 48" x 16' Milling Machine is on the job. GRAY's unit

head versatility, great operating convenience, and high precision performance slashed milling time to 1/4 . . . increased production 400%

Further proof that a GRAY in your shop will look just as good to your Treasurer as to your Superintendent.

Write today • get the story on HIGH tow cost PRODUCTION

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planers • milling planers
planer type milling machines
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CINCINNATI 7, ONIO, U. S. A.

SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. . SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

MACHINERY, October, 1952-117



9 design problems that can be met with the...

# Allenut

Ever-increasing applications for the new ALLENUT have caused sales to double within the past two years. Here are some of the things it can do to aid your product designing:



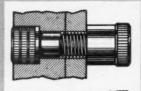
1. Self-anchoring to any motal. Allenut provides positive anchoring action through its hardened knurls.

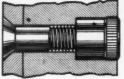
2. Compact design. Requires no space for box wrenching. 12-point socket permits tightening in awkward places.

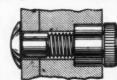
3. Smooth surfaces. Fits flush or below surface in counterbored hole . . . permits streamlined, safe surfaces.

4. A ready-made, bardened, tapped hole. When used as a bushing, prevents costly stripping of threads caused by frequent removal and replacement of screw or bolt. In castings and other soft metals a stripped hole can be counterbored, an Allenut inserted and the same bolt or screw used.

5. Tighter fit. Greater thread contact than with ordinary nuts because of Class 3 fit. Weld-like setups accomplished with one hand wrenching. Allenut holds firm against turn of screw.





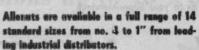


Usable with any type of bolt or screw.
 Permits space-saving, internal wrenching of cap screws, T bolts, machine bolts, and other common fasteners.

7. Saves parts. No washers required when anchored.

8. Easier to use. Knurled ring facilitates fingering-in. Allenut is always square to counterbored hole. Removable by hitting screw or bolt head with tap of a hammer.

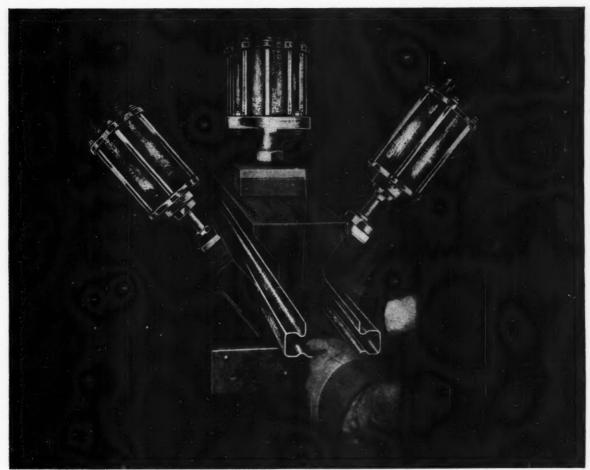
 Revsable indeflattely. Anchoring action remains unimpaired. Hardened threads and socket stand up under repeated removal and replacement.



We welcome your inquiry and request for engineering details on Allenut applications.







Forming metals in press equipped with draw dies fabricated from Formica "Gauge-wood"

### **NEW TOOLS FOR METAL FORMING**

There's a new source of tools for the metalworking industries—densified wood, product of the union of wood and BAKELITE Phenolic Resins. Aircraft part templates, bearings, automotive part dimension gauges, drill jigs, and foundry patterns are already being made from this unusual material. Its advantages—high impact strength, comparatively light



weight, ease of repair, and economy.

Densified wood, in the form known as Formica "Gauge-wood," is made into tools that maintain their exact size and shape under variable conditions of heat and moisture. It is dimensionally stable, resistant to water, chemical attack, abrasion, and warping. It can be bored, threaded, tapered, grooved or machined to close tolerances, then buffed to a high surface luster. It may be altered or repaired quickly and economically by patching.

Cross-laminated veneers are impregnated with BAKELITE Phenolic Resins and pressed to 50% of the original thickness to form densified wood, making it a hard, compact, wood-resin structure. Harder than any solid wood, lighter than any

solid metal, it is well suited to jobs requiring strength, stability, and accuracy. It may be useful in your operations. For information, write Dept. DZ-19, requesting a copy of booklet H-12, "Densified Wood Made with BAKELITE Phenolic Resins."

### BAKELITE

PHENOLIC RESINS



#### BAKELITE COMPANY

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street, New York 17, N. Y.

In Canada : Bakelite Company (Canada) Ltd., Belleville, Ont.

MACHINERY, October, 1952-119



and ANGULAR ADJUSTMENT

With the Full Floating Holder, another of the Erickson family of Precision Holding Tools, work and cutting tools may be quickly and easily adjusted to offset machine errors.

This Precision Holder compensates for *both* parallel and angular misalignment with the work spindle through the use of mechanical principles never before utilized in any floating holder.

Designed for floating reamers, taps, die-heads and all other chuck-held cutting tools, the versatile Erickson Full Floating Holder will help you increase production, reduce scrap, and lower tooling costs.

A-4004

Available in Taper, Bushing and Erickson Collet Types

#### **Write for Catalog Today**

Catalog A: Precision Collet Chucks

Catalog B: Adjustable and Full Floating Holders

Catalog C: Precision Tap Chucks

Catalog D: Speed Chucks and Air Operated Cylinders

Catalog E: Precision Expanding Mandrels

Catalog F: Speed Indexers

Cotolog G: Boring and Reaming Tools



## ERICKSON TOOLS

DIVISION OF THE ERICKSON STEEL COMPANY

2319G HAMILTON AVENUE

CLEVELAND 14, OHIO







When job specifications leave no leeway, when extreme tolerances must be maintained ... that's when the built-in precision and absolute tolerance control of Grand Rapids Grinders proves most valuable. Defense commitments make it im-

possible for us to fill your orders as rapidly as we'd like to . . . but we know our customers can appreciate the reasons for delay. As always, we're doing our best to serve you.

GALLMEYER & LIVINGSTON CO.

305 Straight Ave., Grand Rapids, Mich.



GRAND RAPIDS GRINDERS

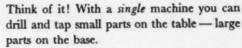
... the very best

Manufacturers of SURFACE GRINDERS . CUTTER and TOOL GRINDERS . TAP and DRILL GRINDERS

DRILL AND TAP

ON BASE
OR TABLE

with Fosdick's Sensitive Radial



Drill holes up to  $1\frac{1}{2}$ ". Tap with Fosdick's special Automatic Tapping Control\* that saves time by returning the spindle to forward rotation the instant the tap clears the work.

Imagine the convenience of the fixed-height arm that swings  $360^{\circ}$  — controls are always handy. And the table adjusts to exactly the right height for your work, or swings out of the way. No other drill gives you this versatility and convenience.

Can't your shop benefit from the volume and variety of work this combined sensitive and radial can produce? And so economically!

Get the facts from your nearby Fosdick Distributor. If this isn't convenient, write us today for Bulletin SRM.

\* Available as extra equipment.

HERE'S HOW Lodge and Shipley
BUILDS LATHES WITH THE HELP OF
SENSITIVE RADIAL VERSATILITY

Clamped to the vee on the table is a tailstock spindle. Operation: drill, chamfer and tap 4 holes. 17/64" drill, 1020 rpm, .004 ipr, 7/8" deep. Chamfer, 1020 rpm. Tap 5/16" x 18 thread using Automatic Tapping Control, 240 rpm, 1/2" deep. And Lodge & Shipley uses their Sensitive Radial for a variety of other work including steel tool blocks, levers and multiple-drilled cam plates.

## THE FOSDICK MACHINE TOOL CO.,

RADIAL DRILLS

SENSITIVE AND UPRIGHT DRILLS

JIG BORERS

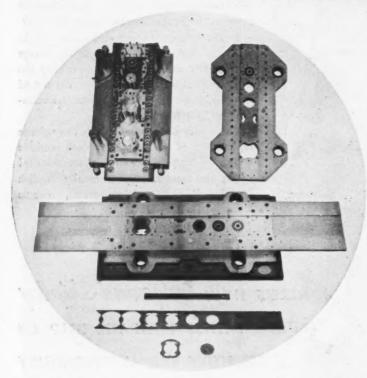
AUTOMATIC POSITIONING MACHINES

SENSITIVE RADIAL DRILLS

MACHINERY, October, 1952-123

## This die was not just "made"...

## it was ENGINEERED



Just a choice of words, you say? No, it's more than that. The progressive steel lamination die shown here was hole-bored, hole-ground and contour-ground to pre-engineered dimensions entirely on Moore-built machines in the Moore toolroom. It exemplifies the application of engineering principles that put diemaking on an interchangeable parts-and-assembly basis for the first time.

Let's take a close look at this die: All die sections are mounted in a hardened nickel-chrome frame for maximum production and die life; the die set was specially made by Moore. The spring stripper is guided on four main posts. High-speed inserts are set into hardened steel frames.

Moore produced all parts of the die to figures instead of to "fit". This was done concurrently by several toolmakers instead of progressively as a slow, one-man job.

#### Precision Hole Location and Contour Grinding Methods Assure Accuracy, Speed, Economy

THE NO. 2 MOORE JIG BORER bored all holes before hardening, thus holding the location as close as possible to eliminate

excessive grinding. With its built-in system of accurate lead screws, the Moore Jig Borer can spot, drill, bore or ream all holes in a workpiece with minimum tool changes and to close tolerances.

Punches and dies of the first station—at the right in the photograph—were ground with a *Moore Panto-Crush Wheel Dresser*. This machine, which combines roll-crushing and diamond dressing, did the required linear contour grinding quickly and effi-



No. 2 MOORE JIG BORER

ciently. Moore Motorized Centers handled several of the smaller grinding jobs.

WITH THE NO. 2 MOORE JIG GRINDER, all die sections were screwed and doweled into place, put on the machine and ground in *one* set-up. This eliminated separate section hole-

grinding and the accompanying difficulty of accurately locating each section in the die bed. The Jig Grinder does the job in onethird the time required by previous methods.

To grind Stations 2, 3, 4, 5 and 6, the new contour-grinding and slot-grinding features of the Jig Grinder were utilized.

Die try-out and assembly operations were performed the modern, fast, "mechanized" way on the *Moore Die Flipper*.

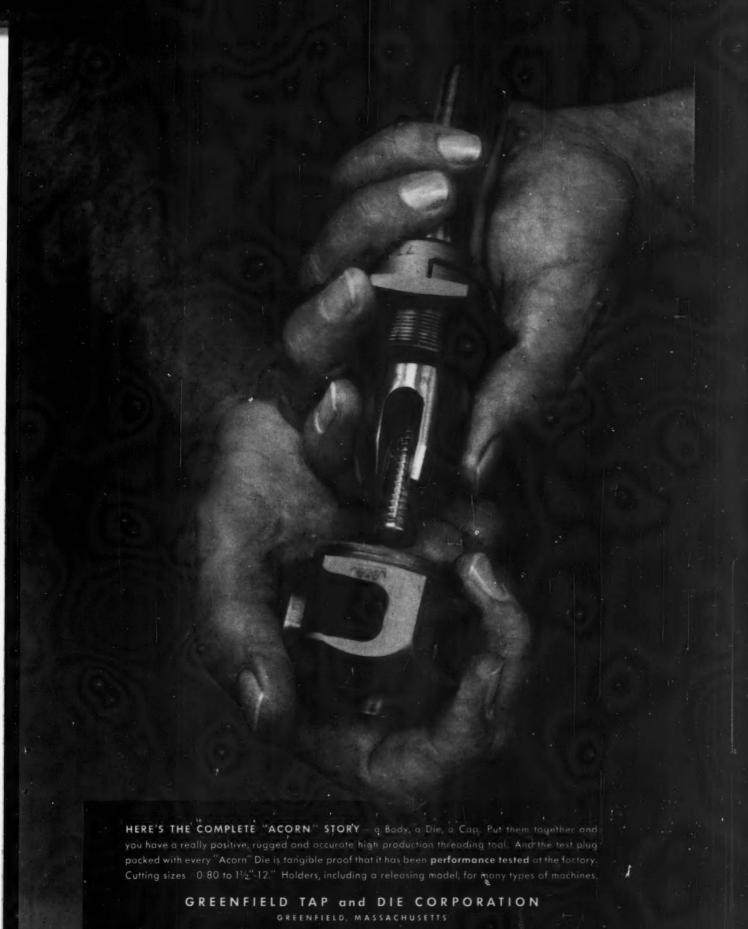
End results? Moore equipment brings true interchangeability to the toolroom, lowers tool costs, increases toolroom capacity, prolongs die life and achieves greater accuracy.

No. 2 MOORE JIG GRINDER

Detailed bulletins on these machines are yours for the asking-today. Write to: Moore Special Tool Company, Inc., 734 Union Avenue, Bridgeport 7, Conn.

### ADD GOVE TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS
DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES



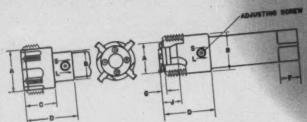
## solid adjustable tap

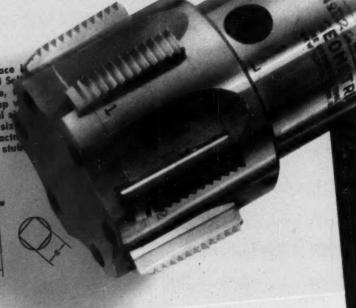


Bulletin SJ 4 pages

## Class SI

Where time for backing out is unimportant, where space limited, or wherever a solid tap is desired, the Class SJ Sc. Adjustable Tap is recommended. Within its size range, simple tap will do any job that a conventional solid tap will do any job that a conventional solid tap will do, and in addition can be adjusted to required decimal side, and in addition can be used for more than one size of fits. Furthermore it may be used for more than one size of the pythe use of interchangeable chasers. Its compacting makes the SJ ideal for machines demanding a short, stuffing, or when overhang must be avoided. tap, or when overhang must be avoided.





## SPECIFICATIONS CLASS SJ TAPS

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	196-1%		11	11/4	Eclat	17/12	13/8		234	11%	11/8	3/	-	16	7/6	2	5	4	2	5	11	2	-
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	214-214		0	21/2	Egypt	23%	23/8	1	-	1 2000	1117	6 !	1/4	1/0		21	-	1/4 5	2	-	-	74	3 6
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8 6 -7 Epoch 6 31/6 31/6 6 612-812

## GEOMETRIC TOOL COMPANY DIVISION Greenfield Tap and Die Corporation NEW HAVEN 15, CONNECTICUT



#### Put 'em on a diet . . . with Pure Oil Industrial Lubricants

In the complete line of high-quality industrial lubricants Pure Oil makes, you will find many oils and greases designed to do several *different* jobs, instead of one specific job.

And to do each job equally well.

This makes it possible for you to do all your lubricating with fewer lubricants. In other words, you can



## simplify and save . . . with Pure Oil Industrial Lubricants

If you would like to keep your lubrication requirements from hogging your profits (and a penny saved is more than ever a penny earned, these days!) write: The Pure Oil Company, Industrial Sales, 35 E. Wacker Drive, Chicago 1, Illinois.



Pneumatic Cylinders

## NOW.

MOST COMPLETE LINE
OF AIR CONTROL
EQUIPMENT!

Really complete, the Hannisin line of pneumatic cylinders is made with two types of pistons... bores from 1" to 16"... six standard mountings. Really standard, these cylinders are tooled to tolerances that assure accurate mounting to make assembly to your machines easier. Really built, each cylinder is "TRU-BORED" and honed, piston rods are ground and polished, interchangeable end caps, heavy duty tie rods... rugged, yet precision construction throughout!



#### Disc Type Air Centrel Valves



Sliding disc type air-operated valves (Provide effections hand or foot control)



Designed for smooth, positive and accurate control of air-operated equipment. Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation. Sizes from 1/4" to 1/4" 1.P.S.

Write for Bulletin 57-W





Hannifin "Air Warden" units are the finest protection possible for air-operated equipment. Complete units include: (1) Air Filter which removes grit, dirt, scale, moisture, emulsified oil; (2) Self-Bleeding Pressure Regulator that assures absolute stability of secondary pressure; and (3) Atomizing Type Lubricator fillable without shutting off air pressure. Components also sold separately. Write for Bulletin 1010B

do ALL you CAN do ... with



Hannifin "Directair" electrically controlled air-operated disc valve

Foot-operated treadle valve (Also spring return and return types)



Standard hand control valve (Single or duplex)

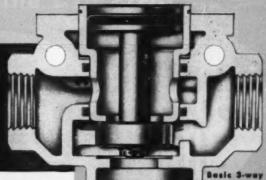
## HANNIFIN

Hannifin Corporation, 1109 S. Kilbourn Ave., Chicago 24, III.

Air and Hydraulic Cylinders • Hydraulic Power Units • Pnoumatic and Hydraulic Presses • Air Control Valves

## PLUS... A Line of Valves Every Maintenance Man Will Appreciate!

Pilot-Master
Valves



Basic 3-way valve body. 4-way is similar but has two piston pospets.

- THIS NEW DESIGN REDUCES DOWN TIME, BECAUSE ...
- there are no springs in the main valve... only moving part is a piston-poppet assembly which fits in an easily removable cartridge, replaceable without disturbing line connections. Besides, in the entire line, there are only two body designs, one for 2-way and 3-way, another for 4-way. The basic 3-way valve operates either 2-way or 3-way, normally open or normally closed, without any internal change whatever. Interchangeable heads give choice of pneumatic or electric control. What all this means is fewer valves to stock, fewer parts to stock, less time lost replacing valves, parts, or control heads.
- Fewer Valves to Stock
- e Fewer Parts to Stock
- Maximum
   Interchangeability
- No Springs in Main Valve

#### Three Types of Head Fit One Body

(Top flanges are same size for every body size, 35" to 114" I.P.S.)

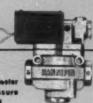


SERIES B-2 Solenoid Pilot-Master Valve with Spring Return Pilot Head



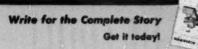


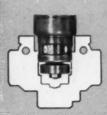
SERIES B-3
Salanoid Pilot-Master
Valve with Pressure
Return Pilot Head



#### features you find in no other valves, compare!

New cartridge design—instantaneous operation, provides speeds to 600 cycles per minute—continuously rated, law amperage salenaids, positively mounted—full pipe capacity—pressure range from 15 to 150 P.S.I.—corrosion resistant throughout—will operate on liquids as well as air—choice of 10 Pilot Valves, 1/4" I.P.S., for remote control of Master Valves.





#### Exclusive Replaceable Cartridge

Contains every moving part of Master Valve. Two sizes fit all 5 valve sizes. Easily replaced without disturbing main piping connections.

Bulletin 231. Shows and tells all about the rew Hannifin P-M line... Pilot Valves, Master Valves, Pilot-Master Valves... 2-way, 3-way, 4-way.

## HANNIFIN

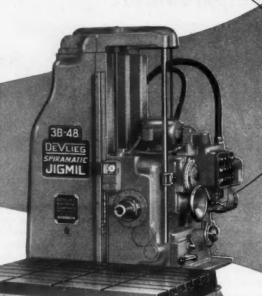
Hannifin Corporation, 1109 S. Kilbourn Ave., Chicago 24, Ill.

Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves



## DEVLIEG Spiramatic

PRECISION BORING
and MILLING MACHINES





for the latest

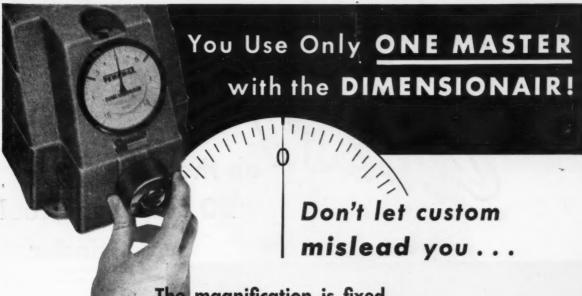
developments in

precision boring

equipment ... consult-

DEVLLEG OF DETRO

450 FAIR AVE., FERNDALE, DETROIT 20, MICH.



The magnification is fixed . . . that is why its scale can be calibrated.

Both the Dimensionair and the master ring are constant. Only the dimension of your workpieces can vary. Because the Dimensionair is a precision measuring instrument with a constant scale value, only a single master is required to check the zero location. Don't let past customs mislead you. The Dimensionair is the only air gage built with enough precision to permit you to use a single master.

## When the Plug Wears You're Still Safe with the Dimensionair.

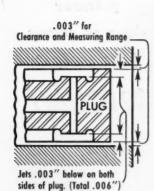
FIRST. This is so because the Dimensionair's greater measuring range allows greater clearance which in turn results in less plug wear. (The Dimensionair Range is .003" on a 2500 to 1 magnification.)

**SECOND.** Only jet wear can change calibration. Dimensionair jets can't wear because they are deeply recessed into the plug body. (On Dimensionair Plugs each jet is .003" below the plug surface.) Hence, a plug can be worn a great deal more than usual without any fear of wearing into the face of the jets.

**THIRD.** When a plug eventually wears to the danger point you will be warned because the gage will clearly show that the readings are no longer stable when you test the plug in the master ring.

**FOURTH.** Because the jets are located so much deeper than has been customary, they are protected from damage and because the jet holes are larger, there is less danger of the holes becoming clogged with dirt.

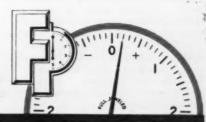
A single master is common practice in using Dial Indicators and other types of precision indicating gages. The inherent precision of the Dimensionair makes it possible for you to continue this practice. Those who already own Dimensionairs find this to be true. It is worth your while to learn how satisfactory it is to use the Dimensionair. FEDERAL PRODUCTS CORPORATION, 1110 Eddy Street, Providence 1, Rhode Island.



MORE RANGE MORE WEAR

## FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing <u>all types</u> of DIMENSIONAL INDICATING GAGES







no other cutter and tool grinder does so many jobs so fast ...so easily!

PEATURING GREATLY INCREASED VERSA-TILITY, the Norton No. 20 Cutter and Tool Grinder brings new speed and economy to the widest range of tool and cutter grinding jobs.

The wheel head can be tilted up to 15° above or below horizontal, and swivelled through 360° - simplifying such ordinarily difficult jobs as grinding taper reamers, step counterbores, form tools and milling cutters.

Other advantages that make this Norton cutter and tool grinder easier to set up and operate include: greater lengths of table traverse and wheel slide travel . . . integral motor spindle . . . centrally located column elevating hand wheel . . . wheel slide graduated dials readable from any position . . . automatically lubricated table ways . . . electric equipment built to Machine Tool Builders' standards . . . wheel spindle reversing switch (optional) for carbide grinding.

Part of the world's most complete line of grinding machines, the No. 20 is a typical development of Norton's engineering leadership.

Remember - only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost. This leadership is at your service for your present or "post emergency" problems.

Why not investigate how the No. 20 can modernize and speed up tool and cutter grinding in your plant. See your Norton Representative for detailed information and ask him

about Norton Cutter and Tool Grinders Nos. 1 and 2, and the Bura-way Grinder for automatic lathe tools. Meanwhile, write direct for Catalog 189. NORTON COMPANY, Machine Division, Worcester 6, Mass.



To Economize Modernize With NEW

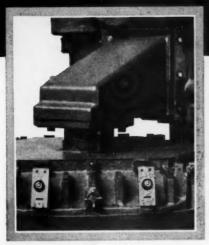


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Making better products to make other products better

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NEWTON VERTICAL SPINDLE ROTARY CONTINUOUS MILLING MACHINES



CENTER SUPPORT Furnished when required

DESIGNED FOR HEAVY MILLING WITH CARBIDE CUTTERS

Among Heavy Machine
Tools built by
Consolidated are . . . .

BORING MILLS
BORING MACHINES
BORING MACHINES
BORING MACHINES
BORING, DRILLING AND
MILLING MACHINES
DRILL AND TOOL
GRINDERS
FLANERS
SLOTTERS
RATEGOAD SHOP TOOLS
AND OTHER
SPECIAL MACHINES

This representative example of Newton high production milling machines has the advanced features required for heavy precision milling with carbide cutters and motors up to 50 H.P. An unusually

rugged frame provides the rigidity necessary to such operation. On long work pieces such as automobile and tractor cylinder heads, 36" between spindles makes possible the completion of the roughing cut before the

finishing cut starts. Independent pick-off gears for each spindle provide the means for correct cutting speeds for both roughing and finishing cuts. Heavy flywheels, solidly attached to each spindle, insure maximum cutter life between grinds. Intermittent feed—rapid traverse attachment and center support are optional. Two standard table sizes. Other table sizes and spindle center distances are available. Newton Milling Machines, applicable to your precision milling problems, will help to step up your production and reduce your costs. Complete information will be furnished upon request.

**BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848** 

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SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

# South Bend 7" Shaper FAST · EFFICIENT ·



Watch your machining costs on small work go down when a South Bend 7" Shaper takes over.

FIRST, its speed — 42 to 195 strokes per minute reduces machining time.

**SECOND**, its 7" stroke will handle a good share of your small toolroom, maintenance and production jobs thus releasing your heavy shapers for larger work. This stops the waste of using excess machine capacity on small jobs.

THIRD, with its small initial cost, less power consumption and low upkeep expense, your equipment budget won't take a beating when you specify South Bend 7" Shapers. Find out how these fast, versatile shapers can save you money. Call your local South Bend distributor today or send the coupon for complete information.

#### SPECIFICATIONS

HAM

Stroke length.......0 to 7"
Strokes per min. (4)...42 to 195
Cutting speeds...3 to 114 feet
per minute

TOOL HEAD

 Vertical travel
 3"

 Tool post slot
 360°

 Head swivels
 360°

 Clapper swivels
 35°

ABLE

VISE

MOTOR

1/3 or 1/2 h.p.



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TOOLS & ATTACHMENTS	9" and 10" BENCH LATHES	FLOOR LATHES	☐ ½" and 1" Collet TURRET LATHES	DRILL PRESSES	BENCH SHAPERS
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Building Better Tools Since 1906 • SOUTH BEND LATHE • South Bend 22, Indiana



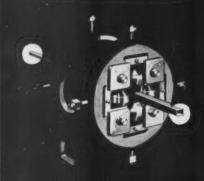
## AMERICAN ELECTRIC FUSION CORP.

MANUFACTURERS OF ELECTRICAL WELDING EQUIPMENT

2600 DIVERSEY AVENUE

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Round tubing produced by AEF Tube Mills can be formed into square, triangular, or other sections with the AEF Turkshead. Operates at Tube Mill speed. Specially formed tubing is cut by a special cutter, interchangeable with the standard AEF Cut-off Unit.



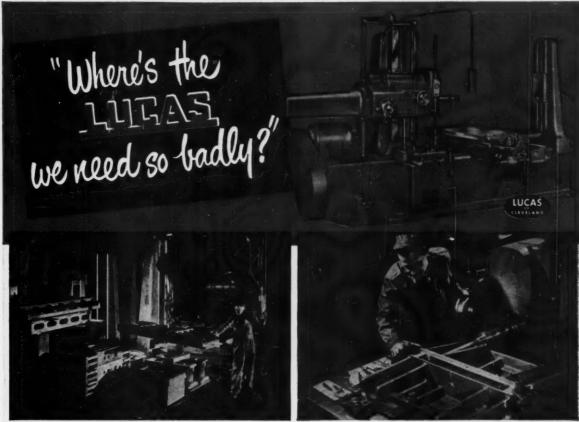
All AEF Spot Welders are designed to permit maximum adjustment to meet specific individual requirements. They may be operated by manual foot pressure or by automatic air. Each Spot Welder is equipped with the patented "Kold-point" Electrode Cooling System. The "Koldpoint" increases efficiency and production speed and insures a low cost of operation. It lengthens the life of the welding tips, reduces time and expense of point dressing, and produces more uniform welding. AEF Spot Welders are manufactured in three me-chanical size groups and in six transformer capacities.



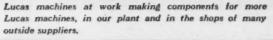
## · QUALITY · MACHINES ·



The CBG - 24 Brazing Machine-developed originally by AEF for a leading Diesel locomotive manufacturer — is built for brazing and silver soldering coil ends of generator and motor armatures. Accommodates armatures of 18" to 42" in diameter and can be adapted with slight modification to any diameter requirements. The CBG-24 may also be used as a source of power supply for portable brazing equipment-and for other brazing and soldering applications.

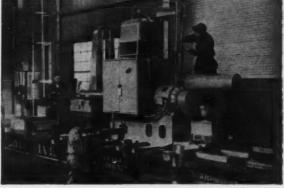


The ultra modern Lucas plant is being used to full capacity with work in process and rough castings waiting to be machined.





Still no sacrifice of Lucas standards. Ultra modern production methods, but still the skilled hand craftsmanship for which there's no satisfactory substitute.



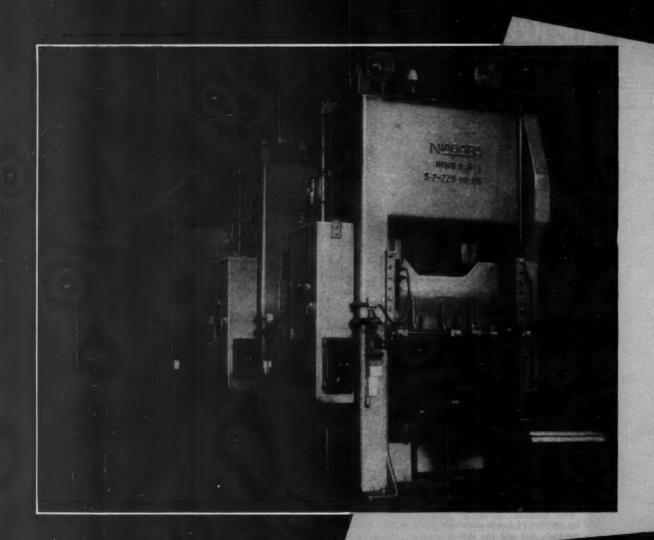
More shipments than ever, but, of course, defense priorities dictate who gets what. Perhaps this is the machine we originally scheduled for you.

achine will always be a time saving oney maker.



LUCAS MACHINE DIVISION . THE NEW BRITAIN MACHINE CO. . CLEVELAND 8, OHIO

## NAGARA



Niusaro Straight Side Dov Crank Presses in one of America Taremost automative plants

NIAGARA MACHINE & TOOL WORKS . BUFFALO 11, N.Y.

## straight side double trank

## Speeding up Defense Production in Large Automotive Plants

Niagara advanced engineering features and modern streamline styling combine to make these presses leaders in their field.

- ◀ Electrically welded steel construction
- Air actuated electrically controlled sleeve and friction clutches
- Anti-friction bearing mounting for high speed shafts, flywheel and clutch wheels
- ◀ Gearing enclosed and running in oil
- Neither gearing nor shafting overhang the working area
  to block light and be a potential danger
- ◀ Single and double geared
- ◀ Single or double end (twin) drive
- Adjustable air counterbalance for slide
- ◆ Pneumatic draw cushions with adjustable pressure and surge tank
- Wide range of sizes and capacities
- ◀ J. I. C. features if desired

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Manufacturers of a complete line of sheet metal working equipment ranging from small hand tools up to large power operated machinery.



## use AIR with care

Careless use of compressed air in cleaning the machine or clearing the work can result in blowing chips, dirt or grit onto the quill, rack, crosshead or other precision fitted surfaces. Use air with care and your Leland-Gifford Drilling Machines will continue to deliver the faultless precision performance for which they were designed and built.

A small point? Yes...but important! Leland-Gifford Drilling Machines are built as trouble-free as master craftsmanship and long experience can make them ...with totally enclosed motors, spline lubrication wipers, oil mist lubricated spindle bearings and many other features to insure lasting precision and safe, dependable operation. But neglect or abuse

can impair the performance of even the finest equipment. With reasonable care and maintenance, your Leland-Gifford Drilling Machines will keep on producing accurate holes year after year. Remember, you are making a valuable contribution to the defense effort when you take the best possible care of your production equipment.

SAVE TIME - CONTACT THE OFFICE NEAREST YOU

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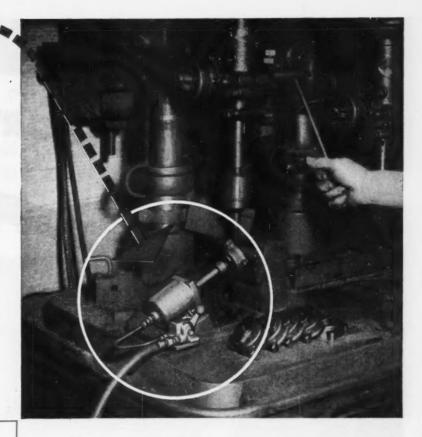
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Version 67

Roceleyen Station

Roceleyen Station

## **Simplify** work-holding problem





ClampAir Cylinder

Watch a worker making ready for a simple drilling operation. He places the work in a fixture and hand-clamps it. With everything all set to go, you'll find he takes as much as ten seconds just to grip the work tightly in the clamp.

Multiply that by thousands of machining operations in a normal high production shop. You'll find a substantial portion of work time is used up before actual production is begun.

You can eliminate nearly all of this lost time with the new Schrader ClampAir. What's more, since the ClampAir takes no more effort than opening a valve, high-priced workers are not tired by useless labor.

The ClampAir is actually a bantam air cylinder, with plenty of power to hold work firmly in place-with the same-holding force every time. That means the end of rejects caused by inconsistent holding forces.

The number of places where ClampAir can serve you well is on drill presses, milling machines, gluing operations, and others too numerous to mention. In all of these, production rates can be upped to higher percentage brackets with ClampAir. And, since ClampAir is basically a push type cylinder, it can be used in many other spots where you need a short, hard stroke.

It's easy to find out how ClampAir can shorten production time, increase worker efficiency. Write, outlining the applications in which you are interested-or fill out the coupon below. We will be glad to help you determine your needs.

Mail This Coupon Today

Air Cylinders . Operating Valves . Press & Shear Controls . Air Ejection Sets \* Blow Guns \* Air Line Couplers \* Air Hose & Fittings \* Hose Reels \* Pressure Regulators & Oilers . Air Strainers • Hydraulic Gauges • Uniflare Tube **Fittings** 

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A. SCHRADER'S SON

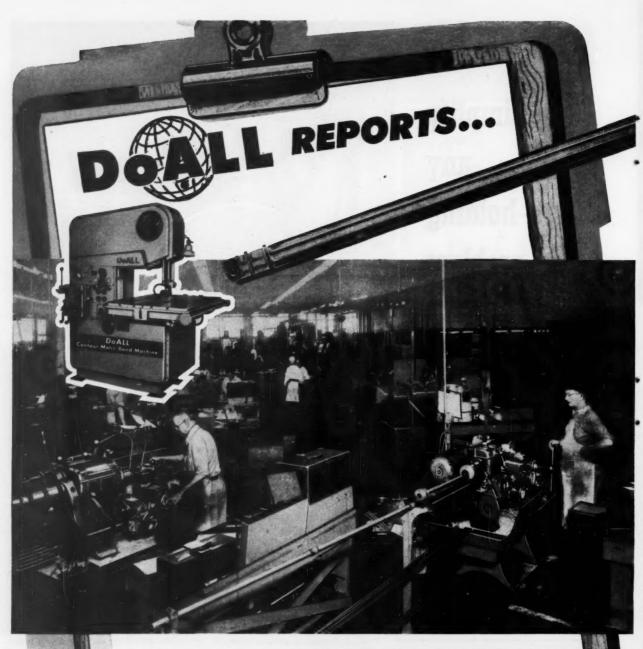
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I am interested in more information on.....

Company\_

Address



Bardons & Oliver Turret Lathes in action at Continental Machines, Inc., total twelve. Nos. 2, 3, 5, 7 Ram Type; also 21 B Saddle type turret lathes are all in use at Continental.

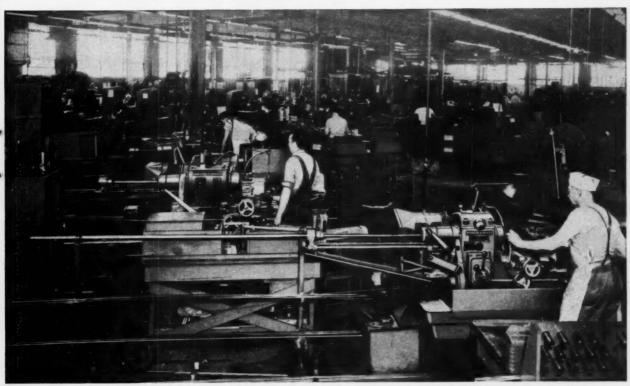
## BARDONS &

1135 WEST 9th STREET

### ... WITH BARDONS & OLIVER

### **Turret** Lathes

- √ "PRECISION TOLERANCES ON BOTH SHORT AND LONG RUNS"
- √ "EXTREMELY LOW MAINTENANCE COST"
- √ "EFFICIENT SERVICE"



Photo, courtesy Continental Machines, Inc.

### OLIVER, Inc.

CLEVELAND 13, OHIO

To quote direct from Mr. J. W. Wilkie, President of Continental Machines, Inc., "It gives me pleasure to advise you that our Bardons & Oliver equipment has given us most efficient service including extremely low maintenance cost and the ability to produce short and long

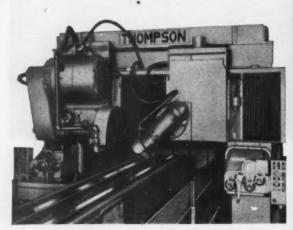
runs within precision tolerances." Continental Machines, Inc., manufacturers of the DoAll precision surface grinders and the complete line of DoAll Band Machines, reports these excellent results with Bardons & Oliver turret lathes. Continental Machines, Inc., have been enthusiastic users of Bardons & Oliver turret lathes for over ten years.

### New Thompson Way Grinder Developments

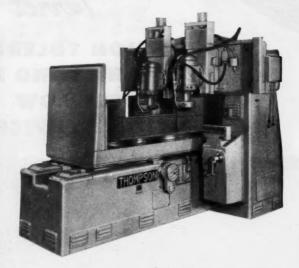
Reduce Costs ... Speed Machine Tool Production

Way Grinders now available with single, multiple heads, or combinations of horizontal and vertical heads and in sizes to meet all requirements.

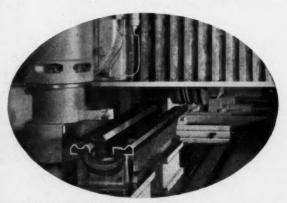
Thompson has produced machine tool way grinders in many types and sizes that have eliminated handwork and produced economical and accurate ground ways. However, recently increased production grinding of ways has been made possible by many new Thompson Way grinding developments such as: automatic grinding and truing cycles; dual vertical or horizontal heads for grinding ways different heights; horizontal multi-wheel grinding and vertical side and undercutting head; Hydrail way grinding for giant columns or bed ways. Three of the new Thompson Way Grinders are shown here.



Designed especially for extremely large machine tool way grinding is this typical Thompson Hydrail Way Grinder. Size 48" x 48" x 192". Part: grinder bed ways.



One of several new Thompson Double Head Dovetail Way Grinders installed to speed work and hold accuracy in the plant of a leading lathe manufacturer.



Multi-wheel grinding with auxiliary vertical head. Equipped with horizontal spindle having dual spaced wheels and auxiliary inclinable spindle. The front contoured grinding wheel grinds the rear set of ways and the rear grinding wheel grinds the front set, with vertical head grinding the sides and undersurface of the ways and rack seat.

Write for details Today.

Thompson Grinders

The Thompson Grinder Company, Springfield, Ohio

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WHEN THE GOING IS TOUGH...



GLEFFURNI. MIGH SPEEN DIMEES

will give you more holes per grind..



Freehone Your Industrial Supply Distribution

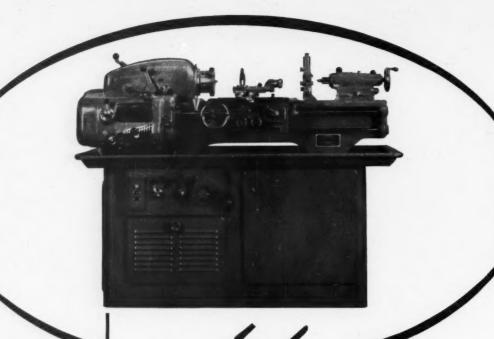


THE CLEVELAND TWIST DRILL C

1242 East 49th Street

Cleveland 14 Ohio

Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 2 • San Francisco 5 • Los Angeles 58
E. P. Barrus, Ltd., London W. 3, England



### **FEATURES:**

- \* Designed and made throughout for PRECISION.
- ★ Hardened and precision ground bed ways.
- ★ Sixty-six thread cutting and feed changes without gear change.
- ★ ALL spindle speeds are stepless, 25 to 2000 RPM, forward and
- \* Choice of M. G. Variable Speed or new Hendey Electronic drive.
- Spindle runs in preloaded, superprecision, anti-friction bearings, both ends.
- \* Super-precision lead screw.
- ★ Safety features preventing simultaneous engagements of belt feed with gear feed, and lead screw with rack feed.
- Separate feed rod (independent of lead screw).
- Special clamping device for tailstock.

## ENCEY!

9"x24" TOOL AND GAGE-MAKERS' LATHE



### FEATURING HARDENED & PRECISION GROUND BED WAYS

The Hendey 9" x 24" Tool and Gage-Makers' Lathe is a high-speed precision lathe — designed to satisfy the universal demand of expert tool and gage makers for a precision lathe of heavier design and greater adaptability. It has a swing over the ways of 10%" and over the cross slide of 5%". Maximum capacity of spring collets is 1%". A choice of the M. G. Variable Speed Drive or the new Hendey Electronic Drive is available. This tool and gage-makers' lathe will perform all operations within its scope most accurately and efficiently—it will save time and money, and eliminate spoilage of work chargeable to inaccuracy, insensitivity or incapacity of lathe equipment.

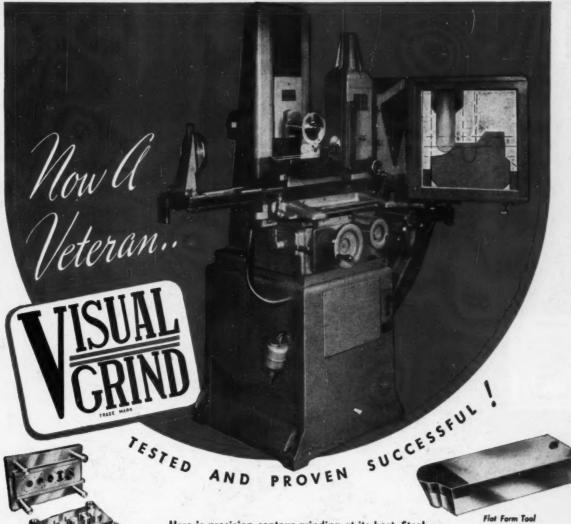
Hendey is especially qualified to manufacture such a lathe, because, for more than 70 years it has made lathes which have proved its claim of "Prestige with Production."

Write for free illustrative catalog on the Hendey 9" x 24" Lathe

the hendey machine company

another product from the plant of precision! MAIN OFFICE & PLANT: TORRINGTON, CONN. BRANCH OFFICES: New York, Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco REPRESENTATIVES: Philadelphia, Cleveland, Pittsburgh





Progressive Die



Here is precision contour grinding at its best. Steel and tungsten carbide form tools, die sections, templates and related items are efficiently processed in dependable, economical fashion. Our basic magnetic chuck work-holder affords positive positioning yet with flexibility for cam, circular and index grinding with the proper fixtures. Workpiece quality is controlled visually at all stages, either while using pre-dressed grinding wheels or when generating the required contour by means of successive, controlled movements. Durable construction around precision optics insures rigidity and long life.

Ask for Bulletin "M-10"







HE CLEVELAND GRINDING MACHINE COMPANY

1643 EDDY ROAD

CLEVELAND 12, OHIO

Possibilities in Optical Grinding

# SNYDER MACHINES CONTROL COSTS

22 STATION AUTOMATIC TRANSFER

86 INTAKE MANIFOLDS AN HOUR AT 100% EFFICIENCY





MILLS . DRILLS . TAPS . REAMS

SPOTFACES CARBURETOR AND WATER OUTLET PADS

AUTOMATIC HYDRAULIC POSITIONING

AUTOMATIC CLAMPING . AUTOMATIC TRANSFER

AUTOMATIC CONTROLS WITH SWITCH-OVER TO MANUAL

AUTOMATIC LUBRICATION

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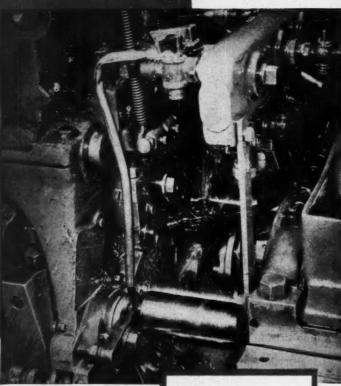
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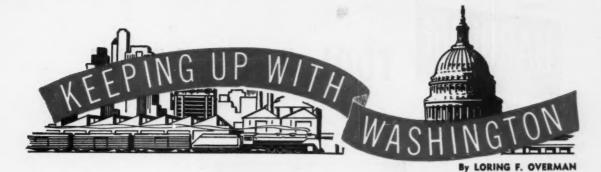
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148-MACHINERY, October, 1952



### Military Cancellations and Facilities Expansion

"W HAT can be done to, with, by, about, and for the machine tool industry" became a top problem again in Washington when that industry's Advisory Committee met there recently with big brass of the military and civilian defense agencies. The meeting turned out to be a marathon take-down-your-hair session, with uncomfortable moments for all concerned.

Armed Forces representatives were asked a number of questions. Why, for example, does the military cancel contracts overnight, while still expecting industry to keep its order boards open for possible future emergency business? Why does the military withhold commitments, and in the same breath insist that industry broaden its mobilization base in anticipation of some "iffy" action in the future?

How much "water" is in the interim program for facilities expansion, recently publicized by the National Production Authority? Just what is expected of the machine tool industry? How long must it expand in the face of shrinking order boards? Who will shoulder the burden of expansion "when comes the end"?

Why do purchasing agents, armed with top priority evidence, demand immediate deliveries "regardless of cost," while the Office of Price Stabilization tries to enforce a set of pricing standards unintelligible even to men familiar with the baffing intricacies of machine tool design?

INFORMAL reports brought out of the meeting, which lasted from 10:00 A.M. until past dark on August 21, indicated that everybody asked questions, but nobody had answers. The one conclusion was that "It's a problem," and all concerned went home feeling helped by knowing the other fellow's side of the story.

So without being "pinned down," all who attended the meeting agreed to work together toward a mutually satisfactory solution of the problems. Adjournment time left the feeling that nothing of striking importance can be expected until the political atmosphere clears. Armed Forces folks who may have missed the ap-

propriations boat in laying out expansion programs will have to await a new Congress and a new policy. Price folks, whose lease on life is precarious, are more concerned with their own futures than with complex pricing formulas. The materials allocation groups are trying to move softly pending future developments.

It is to be hoped that the Kremlin also procrastinates.

MEANWHILE, the machine tool industry pointed with some pride to Census Bureau reports of 1951 shipments valued at \$629,722,000-nearly double the 1950 shipments of \$315,741,000. Fifty-eight per cent of total shipments during 1951 were of the following types: boring machines, 2518 units valued at \$75,068,000 compared with 1363 units valued at \$29,402,000 in 1950; grinding and polishing machines, 109,782 units valued at \$121,115,000 compared with 79,274 units at \$60,859,000 in 1950; and lathes, 43,107 units valued at \$170,529,000 compared with 30,251 units at \$89,716,000 in 1950.

Other shipments in 1951 included 681 broaching machines (374 in 1950); 19,257 drilling machines (9917 in 1950); 2452 gear-cutting and finishing machines (1402 in 1950); 11,287 milling machines (6975 in 1950); 111 planers (84 in 1950); and 1096 shapers (794 in 1950)

ONE of the developments which could alter military needs for some machine tools is the heavy press program which is being hurried along by the United States Air Force. Construction of seventeen heavy presses-eight extrusion and nine forge, ranging from 8000 to 50,000 tons capacity-has begun at various points in the United States. Within the next few years, these giant machines will be turning out large aircraft and engine parts in a fraction of the time required by present methods, and at important dollar savings. The presses promise to do away with a great deal of the present "bits and pieces" assembly. Instead they will stamp out whole wing sections, ribs, frames, and other structural members in one operation.

THE Air Force now has in operation three heavy presses—two German-made machines of 16,500 tons capacity each, and one 18,000-ton press of American make. Congress has appropriated \$210,000,000 toward the heavy press program, which includes construction on government land and operation by private industry under lease. In addition to this sum, \$179,000,000 was requested in the 1953 Air Force budget.

### **Washington Notes**

A<sup>N</sup> all-inclusive preference status granted since June 3 on rated orders for machine tools and certain other machines is removed by Amended Direction 4 to CMP Reg. 3. The special treatment was extended to DO rated orders placed by aircraft and ammunition factories, atomic energy plants, and other vital defense programs. Channeling of the items covered by Direction 4 is now accomplished through separate NPA Orders M-41 for machine tools, M-43 for construction equipment, N-44 for power equipment, M-95 for railroad machinery, and M-17, for certain components.

REVOCATION of NPA M-104 (finishes for metal-working machines) removes restrictions on the application of protective finishes, either as to content or as to number of protective coatings. Machine tools affected by the Order were listed in Exhibit A of NPA Order M-41.

TWO technical leaflets, published by the Small Defense Plants Administration, are entitled "Technical Aids No. 5 — Selecting the Right Tool Steel" and "Technical Aids No. 6 — Precision Measurement of Work-Pieces." Free copies may be obtained from field offices of either the Small Business Plants Administration or the U. S. Department of Commerce.

NEW deputy director of the NPA Metal-working Equipment Division, James Whitney Sibley, Jr., succeeds Lincoln Love, who returns to Ford Motor Co., Detroit. Mr. Sibley is on loan from the Buick Division of the General Motors Corporation, Flint, Mich.



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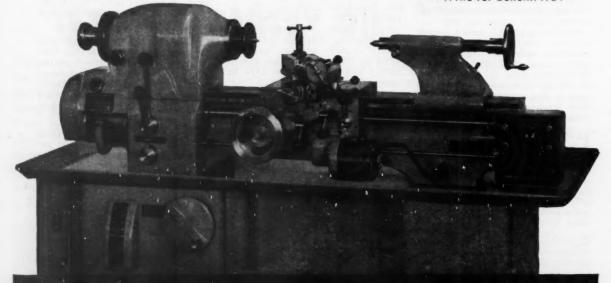


MEDIUM FEED



FINE FEED

Write for Bulletin HLV



HARDINGE BROTHERS, INC., ELMIRA, N. Y.

# Master Tools of Progress and Protection

THE man on the street seldom hears about machine tools in time of peace, but whenever the nation becomes involved in war, newspapers and other periodicals make him acutely aware of the importance of machine tools to national survival. He soon learns the basic fact that the nations capable of producing the largest quantities of efficient fighting equipment and of putting that equipment to use, are the ones who eventually win. He finds out that modern fighting equipment can be produced only with machine tools and that they must be available in abundance.

The general public, however, should also be educated to the fact that the world's highest standards of living are found in that nation which produces and uses the greatest number of machine tools. This is no mere coincidence. Why is it that the average family in this country can own an automobile for pleasure purposes, a television set, and an electrical dishwashing machine? It is because of the large-volume production of these things at sufficiently low cost to suit the average pocketbook.

Large\* volume production is accomplished through the employment of machine tools so designed that they can be operated at great efficiency even by unskilled help—men who may step into a shop direct from the farm or from a city street and immediately take on a job running a machine that may turn out parts accurate to within several ten-thousandths of an inch.

Furthermore, the general public does not understand that the machinery which wove the clothes we wear, canned the food we eat, bottled the milk we drink, or pressed the pills we swallow, also are built by machine tools. Even machine tools themselves can be made only by using other machine tools. To state the matter succinctly, machine tools are at the base of modern civilized existence as we know it in this country. They provide the comfort, happiness, and security of our daily life.

Every person has a tremendous stake in machine tools because of the indisputable fact that higher real wages are the offspring of increased productive efficiency. Greater productive efficiency, in turn, is made possible through the development of machine tools that turn out products of better quality at faster rates.

The last fifty years have witnessed the greatest industrial expansion in the history of the world—the same fifty years have seen the American machine tool industry develop from a producer of comparatively simple hand-operated machines to a builder of complicated units capable of performing a manifold number of operations simultaneously. At the same time, the design of general-purpose machine tools has advanced tremendously in keeping up with new conceptions of metal cutting.

Machine tools have proved themselves the master tools of progress and protection for the individual and for the nation.

Charles O. Herb



### **How We Take CHANCE OUT of Alloy Buying**

Here's a spark tester checking bars of Ryerson alloy steel. By reading the spark pattern thrown off when each bar is touched with this whirling, abrasive wheel, the tester determines the steel's analysis. In this way he verifies quality-guards against mixed steels.

Spark testing is only one of many steps in the Ryerson Certified Steel Plan for safer alloy buying-a plan especially important to you today, while restrictions are enforcing the use of leaner alloys with unfamiliar heat treatment response.

We also put every heat of Ryerson alloy steel through four separate hardenability tests, carefully recording the results on a Ryerson Alloy Certificate which goes with the steel. These tests enable you to buy Ryerson alloys on the basis of hardenability as well as analysis—the safest way to buy under today's changing conditions. And the recorded test results safely guide your heat treatment.

So play safe. Order from Ryerson where you can specify hardenability and be doubly sure. Stocks are out of balance from a size standpoint, but in all probability we can take care of your requirements.

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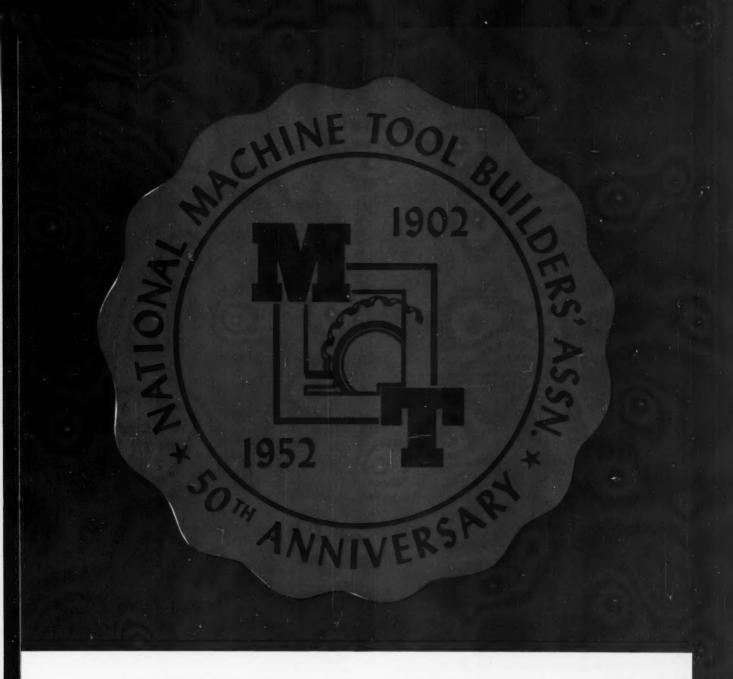
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### Fifty Years of Service

FIFTY years ago this month, the National Machine Tool Builders' Association held its first annual convention, and so a half century of service to the nation and all its industries has been completed. In this issue, political and industrial leaders join MACHINERY in paying tribute to the machine tool industry, which is the foundation of high living standards in time of peace and the cornerstone of national defense in time of war.

# Manufacturing Abundance

ACHINE tool builders have produced the equipment that has won one of the greatest battles that humanity has ever fought. I don't mean World War II— I mean America's battle for the abundant life.

There was a time when 85 per cent of our citizens worked on farms to raise food. Today, about 15 per cent of them do it and a large percentage of the rest, in fact millions, are in our shops using machine tools. The ability to go from agriculture to manufacture had laid the foundation under all of our great industries, and has made our progress possible.

The automobile is only one of many things made with machine tools. We have electric refrigerators, radios, washing machines, stoves, and many other appliances you can easily call to mind. All of them brought to market millions of people who could not have afforded these things if it had not been for what we call "interchangeability of parts"—more often referred to as "mass production."

Let's make an inventory of the United States. I would like to see this inventory posted in every school and public building. It should state:

"We have 155,000,000 people. We have only 6 per cent of the world's land.

"We have 48,000,000 automobiles, which is 76 per cent of all there are in the world.

"We have over 38,000,000 telephones, which is 58 per cent of all there are in the world.

"We have 62,000,000 radio and TV sets, 31 per cent of the world's total."

And so on.

Then, let's have a coupon attached to the inventory, offering \$1000 to anyone who can write in the name of any other country in the world that can come anywhere near our own.

After you give that inventory some thought, you might want to join my new society which I call "The Utopian Transportation Society."

Its purpose is to pay the one-way fare of all those people who want to go places that are better than the United States. Let me add that I want them to go where they want to go, and not where you would want them to go.

Just as they have done in the United States, machine tools could win the Battle for Abundance in other nations, too, if they would listen to us. There are about two billion people in the world and only about 15 per cent of them have ever had enough to eat. We know it is possible to feed the world if they will listen to us. Why do they refuse to listen?

The obstacles are ideological, religious, and political.

A friend of mine was in India some time ago. He was much upset over conditions there. They didn't have good water, so he put a well-digging outfit to work in little villages. The people didn't like this. My friend pointed out that people were dying because they didn't have pure water; that when they got pure water they lived longer. Well, their reaction was that if they were to live longer, there would not be enough food and they would die of starvation. So then he said, "Why can't we get more model farms over here to raise more food?" He was amazed at the difficulties that were put in his way.

We can give the world the tools that will win the Battle for Abundance but these people will have to do their own fighting, and to do that they must first overcome the prejudices and the ideologies that stand in their way.

Opportunities for increasing the production of the world are so great that I don't believe there is any finish line beyond which machine tool builders cannot get. I never like to think of this country as arriving at some particular place. I don't think we ever want to arrive. We are interested only in making progress.

Sometimes, however, we hear very pessimistic



### By Charles F. Kettering Research Consultant General Motors Corporation

predictions. In the automobile business, where I happen to be, somebody is always having us running out of gasoline. That worried me for a great many years. I think the longest time that anybody ever predicted our petroleum supplies would last was eighteen years. Come to think about it, that was thirty years ago. All this time we have been just on the brink of running out of petroleum. Because we are interested in Diesel locomotives, which take petroleum too, it has been said that we are hastening the day when we will run out of fuel oil. The statisticians have got it all figured out and put down in numbers.

But all these predictions are based on the presumption that we will do certain things. Let's presume that we won't do those things. Well, then, under those circumstances they say we will run out of fuel in 3500 years instead of just eighteen. Frankly, I am not concerned about more than the first thousand years. With 3500 years to go, we ought to be able to develop atomic energy by then.

I can remember when a thousandth of an inch was a very small thing. Today, toolmakers are talking in millionths of an inch, or "microinches." We used to consider the diameter of a human hair—about three-thousandths of an inch—as a small dimension. Today, if you are working to a tolerance of fifteen-millionths of an inch, you will cut that hair up into several thousand "boards," each one fifteen-millionths of an inch thick. When we talk about the distance across a hair we feel as if that is something so wide one might fall through it.

Tool builders are working to closer limits of tolerance only so that the product made with their tools will last longer, work better, and give complete interchangeability of parts.

I am enthusiastic about being an American because I came from the hills in Ohio. I was a



hillbilly. I had one pair of boots each year and didn't put them on too soon in the fall. It was better to walk barefoot in the frosty grass in the fall than in the wet snow in the spring. I didn't know at that time that I was underprivileged because I had to drive the cows through the frosty grass, and stand in a nice warm spot where a cow had been, to warm my feet. I walked three miles to school. I thought all of that was wonderful. I thought opportunity depended on knowing how to think with my head and how to do with my hands.

I am enthusiastic about being an American because I have seen the progress that has been made on the farm and in supplying practically all homes with what are now considered necessities of life, but which were unheard of not too many years ago.

American industry, and particularly the machine tool industry, has made these things possible. When I recall what we had when we started and what we have now, I wish I could say in words so dramatic that they would leave a lasting impression, what I think still are our opportunities. The best words I can find are: This is the golden age of opportunity, unlimited.

### Machine Tools and

By The Honorable Ralph E. Flanders United States Senator from Vermont

IFTY years ago the scattered, separated, and uncooperating machine tool companies of the country organized themselves as an industry, and thus for the first time persuaded themselves, as well as the rest of the world, that they had a definite place in the development of modern life.

In that fifty years the wage earner has seen his hours of work decreased weekly from fiftyfive or even sixty hours, to forty or less. He has seen his work made easier. He has seen his real wages go higher. He has found himself able to buy things like electric refrigerators, washing machines, radios, and automobiles which were not even invented fifty years ago or did not exist in their present form. Men work shorter hours with much easier labor and get much greater returns.

The same sort of thing has been happening on the farm. Horse-drawn means of cultivation and dependence on hard hand labor for many farm operations have been replaced by mechanized cultivating, harvesting, and milking, both on small farms and large. Perhaps the farmer's hours have not been shortened much, but with a given amount of help his acreage has doubled



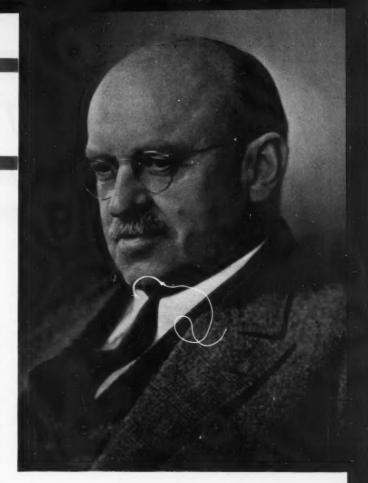
### All of Us

and quadrupled during these fifty years. Meanwhile, his wife has the benefits of electric washing machines and refrigerators. Farm families too have radios and enjoy the automobile for pleasure purposes.

These great material blessings of the last half century came originally from the imagination and intelligence of hundreds of thousands of scientists, inventors, and engineers. But the means by which these ideas and this imagination became the commonplaces of our everyday life is to be found in machine tools, the machines which make machines. Our mechanical civilization is produced in the first instance in the machine shop, or other metal-working establishments. Machine tools make the things we use and enjoy or make the machinery by which those things are produced. Eliminate the machine tool and our whole mechanical civilization would dissolve.

Of course we don't eliminate the machine tool, but most unfortunately, we sometimes forget it. We forgot it at the beginning of World War I until it suddenly became clear that you can't fight a war without machine tools to make the arms and armament.

There was enough memory of World War I among the responsible officials in World War II to make it possible to pick up the thread of production fairly early in our defense effort. But the task was so much greater and the demand for the support of machine tools so much vaster than in the first world-wide conflict, that it took a little time to realize the dimensions of the machine tool problem in the titanic second struggle. We got armed as fast as machine tools could be produced—and no faster.



Then came the general cold war, the rearmament of Western Europe, and the Korean hot war. One would have thought that the twicelearned lesson would have been learned for good. But not so. Those responsible for our rearmament were deaf to the earnest suggestions of people in the machine tool and metal-working industries that our defense was dependent on these machines which make machines. The industry was seriously and patriotically concerned but it was treated like a selfish group supporting selfish interests. Many productive months were lost. For the third time the lesson has been learned, and now machine tools have a first priority with arms and armament in the allocation of scarce materials and in general support by the Defense Department.

Whether in war or in peace everything goes back to the machine tool. The engineers, the management, and the workmen in the establishments that combine to form this industry may well be proud of their importance and of their service.



### National Defense Depends on Machine Tools

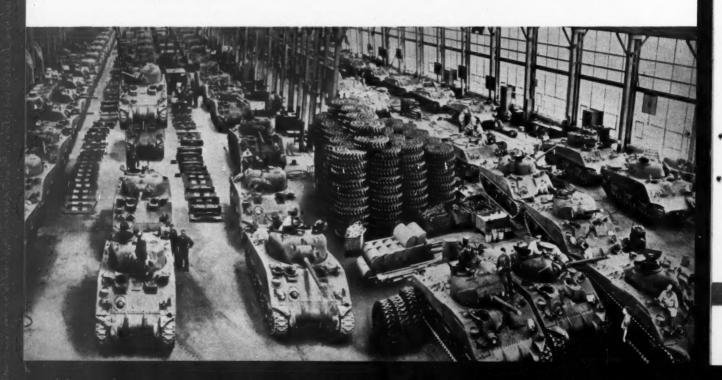
Paradoxical as it may seem to persons unfamiliar with the manufacturing processes of the metal-working industries, the same machines that are literally the foundation of a prosperous peacetime economy are essential to production of fighting equipment in time of war. I am referring to machine tools, without which it would be impossible to engage in modern warfare.

In time of national emergencies, machine tools are required in vast numbers to produce guns, bullets, shells, tanks, aircraft, ships, bombs, bazookas, and every other type of equipment necessary to wage war. In addition, machine tools are necessary for making the machinery that provides the necessities and comforts of our fighting men. The machinery that manufactures their clothing, for example, or the machinery that cans their food, or the agricultural equipment that sows, cultivates, and harvests their food, can be built only through the application of machine tools.

It is a pleasure, therefore, to felicitate the National Machine Tool Builders' Association upon the occasion of the Fiftieth Anniversary of that organization. The Association members and others of the machine tool industry have always rendered yeoman-like service whenever the national welfare has been in jeopardy.

The record of that industry in World War II is worthy of highest praise. It is my understanding that at the time war broke out in Europe, machine tool builders in America were still in the doldrums of the worst depression ever experienced by that industry. The total production of machine tools by members of the Association in 1938 amounted to only \$145,000,000. Employment was far below normal, and shops were operating on part-time schedules.

Despite such an unfavorable situation, the industry was able to more than triple its annual production by 1940 in turning out equipment for our subsequent allies and for our preparations to enter the conflict. The industry achieved



By The Honorable John D. Small Chairman of the Munitions Board





the phenomenal annual production rate of \$1,320,000,000 in 1942.

The magnitude of this achievement can be visualized when it is understood that the greatest annual production prior to the war amounted to \$220,000,000. That figure was attained in meeting the demands of the first World War.

When the Korean episode suddenly occurred, the machine tool industry was again experiencing a depression, even though most other industries were riding on the crest of prosperity. This peculiar situation was due in large measure to the fact that thousands of machine tools built for producing the sinews of war during World War II had been placed on the used machinery market. However, the machine tool industry once more rose to the occasion and doubled production in one year's time. This feat was accomplished despite serious handicaps, including difficulty in obtaining necessary materials.

The machine tool industry is comprised of sev-

eral hundred companies, small in comparison with most industrial corporations. Many of them are privately owned concerns, and prosperity depends largely upon individual enterprise. And, yet, upon the well-being of this comparatively small industry depends the productivity of all our metal-working industries, whether in time of peace or time of war.

Looking to the future, it seems that the backlog of orders for the machine tool industry is decreasing and that in the relatively near future this industry will encounter serious realignment. The Munitions Board is cognizant of this problem and is doing everything within its power in cooperation with the Defense Production Administration to ensure that, in the days ahead, the industry will remain healthy.

A progressive and prosperous machine tool industry will always be one of the nation's great assets. It is a potent deterring force to the perpetrators of aggression on the Western World.





### Machine the Farm

By Robert P. Messenger Executive Vice-President International Harvester Co.

HE occasion of the Fiftieth Anniversary of the National Machine Tool Builders' Association is certainly an appropriate time to recall the highly important contribution which the machine tool industry has made to the development of farm machinery and tractors.

Few people realize that the farm implement industry was the pioneer in the so-called "mass production" of heavier types of machinery in this country. As far back as the 1870's and 1880's, there was a large daily production of machines with fully interchangeable parts. My recollection in this field goes back well over forty years and I can recall from the very earliest days of my experience that relatively complicated machines, such as grain binders and reapers, were individually packed as loose parts and sub-assemblies, and shipped to far-reaching parts of the world. When the boxes were opened, workable machines could be assembled without trouble.

This, of course, was due to the fact that even in those early days machine tools insured the accuracy and interchangeability of each item. It is, therefore, correct to assume that the machine tool industry of the United States has been one of the foundations on which the farm implement industry was built, and the resulting benefits to mankind are well known.

The mass production of farm machinery is the key to the mechanization of the farm. Mechanization has been an important aid to the great increase in the production of food and fiber for human use. At the same time, because fewer people are needed to do that job, it has made possible the flow of people from farm to city to establish our great industrial and urban economy.

In the early days of the farm implement industry, the principal manufacturing tools were what are now generally termed "standard machine tools," such as lathes, drill presses, and milling machines, and woodworking and forging machinery of various kinds. Special tools for performing several operations simultaneously were few and far between, but as time went on these were developed, and now the farm machinery builders are highly conscious of what can be done by utilizing the many short cuts in time and labor which the machine tool industry has developed.

Farm machinery today includes the farm tractor industry which, from a small beginning about thirty-five years ago, has reached matur-



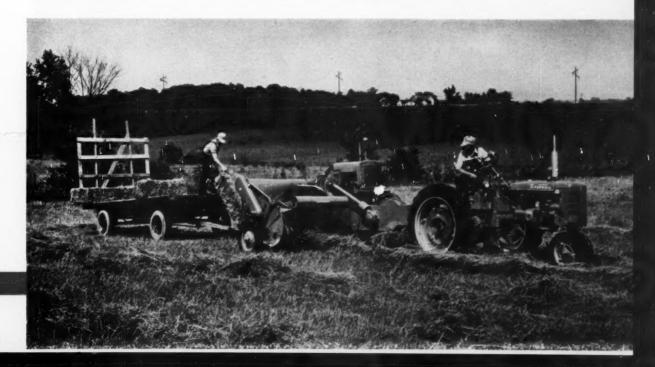
## Tools Helped to Develop Implement Business

ity. The manufacture of farm tractors is, perhaps, even more dependent on machine tools than farm implements are because of the higher standards of precision required, and the need for engines and transmissions which can only be produced by machine tools of high quality and performance. The farm tractor industry obviously benefited tremendously from the almost simultaneous development of the automobile industry, and has run parallel to it in production methods.

The farm tractor today is a very high-grade job indeed. It is not merely a four-wheeled self-propelled vehicle, but a complicated power plant with means for transferring power to coupled implements; with hydraulic devices for lifting and applying pressure to attached and coupled implements; with electric starting and lighting; and with other features. The farm tractor becomes more complicated and more versatile from year to year, and many new developments are under way at the present time which will need the close cooperation of the machine tool industry to put them across.

With the advent of the farm tractor it was necessary to change the design of practically all farm machinery. Increased operating speeds and increased stresses on bearings and other parts called for a change from the old constructions which were designed for horses. The continual raising of horsepower in tractors, and the addition of extra speed ranges, made it imperative to build farm machinery more and more along automotive lines, with stronger parts, high-quality ball and roller bearings, alloy steels, rubber tires, and so on. Here, again, the machine tool industry made it possible to effect an easy transition from one era of farm machinery to another. Many more instances could be cited of the interrelationship between the farm equipment and the machine tool industries.

I am most happy to extend my heartiest congratulations on this Fiftieth Anniversary of the National Machine Tool Builders' Association, with the belief that through the continued cooperation of machine tool builders our equipment problems will be solved as efficiently in the future as they have been in the past.



# Machine-Tool Building— Partners for Greater

In behalf of the General Electric Co., I should like to congratulate the National Machine Tool Builders' Association on the occasion of its Fiftieth Anniversary. The growth and increasing importance of the machine tool industry have paralleled the expansion of the electrical manufacturing industry to an amazing degree. Both industries have constituted an intimate partnership, which has borne dividends in terms of America's great productivity and high standards of manufacturing quality.

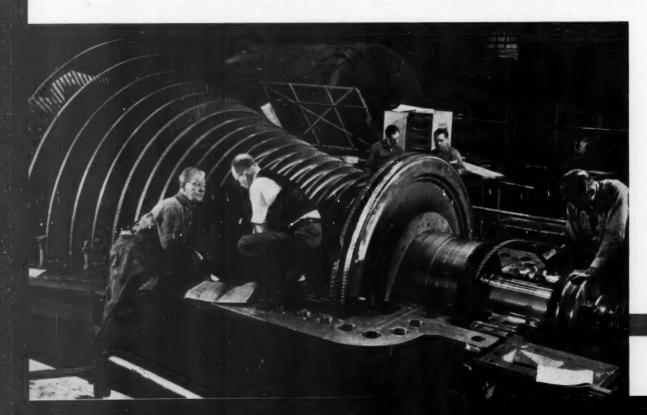
Electrical manufacturing is highly diversified and extremely exacting, with constant demands for new machine tools and methods. This has necessitated a close working relationship with machine tool manufacturers, in order to achieve our objective of effective and complete utilization of machine tools.

Increasingly, two major trends in our manufacturing operation may be discerned. First, we are aiming at increased mechanization of processes. Secondly, we are collaborating with the machine tool industry in the development of

more automatic and special-purpose machines. The underlying causes for both trends are (1) standardization of our product lines, (2) an ever-increasing volume of business, and (3) a constant search for new ways and means of cost reduction.

No better index to G-E's reliance on the machine tool industry can be found than our current capital investment in machine tools, which stands at around \$175,000,000. We have about 250,000 machine tools in use on our various production lines, all of them subject to ceaseless analysis for possible replacement or modification. Many types of products are being changed from the job shop type of manufacture to automatic or semi-automatic machines. This trend has been most apparent in the electronics, small-appliance, lamp, major-appliance, and meter and instrument divisions.

One of our prime problems today is to obtain the greatest possible utilization of machine tools and other facilities. To accomplish this purpose, the General Electric Co. uses combinations of



# Electrical Manufacturing Productivity

By N. M. DuChemin Vice-President—Manufacturing Manufacturing Services Division General Electric Co.

recording watt-hour and regular time meters, which indicate how long the machines are used and how much power is consumed. This is part of an over-all effort to reduce "down" time for machine set-ups and gaging in the manufacture of such apparatus as turbines and generators.

In order to reduce costs, we are constantly developing means of adapting standard machines for special situations, particularly those which do not justify the creation of special machines. The wide diversity of products necessitates an extremely flexible use of manufacturing methods. For example, one apparatus manufacturing requirement is that we mill slots 1 inch wide by 7 to 8 inches deep in rotors weighing around 80 tons. This calls for precision cutting of alloy steel by a specially adapted machine.

On the other hand, in some of our electronics and instrument manufacturing the parts are so small that they can be handled only with difficulty; yet they must be precision tooled to exacting specifications. Highly specialized tools are required for this type of manufacture.

To make certain that General Electric's manufacturing operations are supplied with the most modern tools and techniques, equipment must be purchased with utmost care, and only after investigating all alternate possibilities. Facilities must be laid out properly and integrated with the particular needs of the operation in question.



Our appliance manufacturing operation exemplifies G-E's accelerating trend toward highly automatic production. In making electric refrigerators, use is made of an automatic transfer machine capable of performing all machining functions on a given part—loading, reaming, drilling, cleaning, and inspecting. Indeed, this operation indicates that we have reached the stage where our problem is not so much increased machine speed, but rather faster conveyorization and improved materials handling.

While it is obvious that the company has benefited from the inventive skill of machine tool manufacturers, I believe we have contributed to machine tool builders by helping them electrify and control their machines. Though individual electrification of machine tools started only a

(Continued on page 176)





## Machine Needs of

By J. H. Kindelberger Chairman of the Board and Chief Executive Officer North American Aviation, Inc.

HE high-speed jet-propelled airplane of today is a very different animal from its ancestor of World War II. High speeds and terrific power have brought with them a large number of new troubles—structural, aerodynamic, thermodynamic, electronic, and so on. The heavier structure, the need for more accurate form, the use of heat-resisting materials, and the conditions encountered at higher altitudes have all brought with them requirements for new and different types of production machinery than those that made the much simpler airplanes of the past.

Many of the machine tools are much larger and of improved standard types; others are machines which are more or less unique in the aircraft industry. A good example of a machine which grew up in the aircraft industry, using a new conception of material forming, is the Hufford stretch-forming machine. Machines of this type were used in small sizes during World War II. With wing skins now as thick as 1 inch, machines had to be developed which are completely unrelated to the earlier designs as far as size and power are concerned.

The tremendous stresses in modern planes incident to their speeds have made it necessary to more efficiently employ materials in the structure in order to keep the weight within reasonable bounds. One way in which this is accomplished is by actually "sculpturing" the skin covering. This is ordinarily spoken of as tapering the skin, and while the finished skin does vary in thickness from the fuselage outward, it is not a regular variation, and thick sections are left to counteract local stresses.

Machining of the skins in this manner requires the use of a large planer type milling machine designed especially for the purpose. A machine of this type has been used on the Sabrejet planes since 1946. Eventually there will be a battery of these machines in the North American plant, each one capable of milling a tapered skin 30 feet long. The machine is adapted to make compound cuts with great accuracy at a high cutting speed.

With each improved version of the Sabre, additional strength requirements were presented. The latest innovation in wing construction is the use of a grid, which consists of a piece of thick aluminum plate with routed cavaties in it to reduce weight and, in some instances, with an integral skin. The grid manufacturing operation called for some difficult metal removal which, if it was to be done economically and on a production basis, required a new type of profiling machine.

At our request, a machine tool manufacturer developed a high-speed router having a 30-H.P. motor. The high-power router required automatic movements and remote controls. It was built to be operated from a pedestal wherein the movement is directed by a series of push-buttons. In addition, a carriage type involute router is being designed by the manufacturer specifically for airframe fabrication.

Once the grid is fabricated, it is formed by a technique we evolved called "form-die quenching." The principle of this operation involves



## Tool Builders Meet the Airplane Manufacturers

the quenching of a heat-treated part between the dies in a forming press. In order to maintain physical properties within the metal, stringent specifications and huge (for the aircraft industry) tonnages were necessary. A 7000-ton press is on order which will close on a part and apply full tonnage pressure in one second.

In addition to the die-quenching process (which is now being done on a hydraulic press), pressure forming of deep-drawn parts may be done in a relatively inexpensive way. In forming sheet-metal sections, huge stretch presses with curved jaws designed by North American are saving thousands of dollars per month in materials alone, without regard to the appreciable savings in labor costs.

The increased importance of machine tools in the manufacture of aircraft is best indicated by the fact that during the period from 1945 to 1951 the effort devoted to the machining of parts for Sabres and other North American planes jumped from 12 to 20 per cent of the total labor. Lathes, milling machines, grinding machines, and drilling machines have long been an industrial must, but these too have in many instances been designed to do a specific job in aircraft manufacture. To achieve greater production, higher speeds and feeds have been provided on machine tools. Horsepower has been stepped up and high-cycle current applied. The increased power necessitated strengthening the machines to assure the required accuracy. This made a more expensive piece of equipment, but it is noteworthy that while the cost of milling machines has doubled since World War II, their output has increased from 400 to 500 per cent.

Many have been the demands made on the machine tool industry for equipment to meet peculiar requirements of the aircraft industry. Special machines had to be developed to produce from extruded stock the hinges that join the leading edge of airplanes to the wing proper.

The need of bending small-diameter thin-walled tubing has led to the development of unique tube bending equipment. Electronic analyzers and optical comparators are used today for inspection work that was formerly done with thumbnail and simple micrometer. The airplanes of today are filled with electronic equipment, and because they must fit into extraordinarily small areas, the tubes, motors, and myriad electrical appurtenances require exhaustive testing. For better control at high speeds, Sabre ailerons and elevators have been supplied with full hydraulic power.

The response of machine tool builders to the needs of the aircraft industry has been extraordinary. They have gambled on the development of new equipment and have cooperated fully in the redesign and improvement of older types. Although the aircraft industry is still short of needed tools, it is not because of lack of effort on the part of producers of machine tools and other manufacturing equipment.



### The Nation Needs a Virile



T can hardly be subject to debate that the machine tool is the veritable cornerstone of national defense. Since the days of Eli Whitney, who invented the milling machine as a means for producing muskets, and thereby brought into being the world's first production line—the seed which germinated into a great industrial nation-machine tools have been the very sinews of war, as, indeed, they are of all production. Twice within the last decade and a half, our nation has had to go through a period of developing adequate industrial preparedness before it could solve the pressing problem of military preparedness. But in an atomic age, time may not always be on our side. In another emergency, if, God forbid, it should come, we may not be able to wait the year or two which we have squandered in the past to acquaint ourselves with the task before us and condition

By Frederick S. Blackall, Jr. President and Treasurer The Taft-Peirce Mfg. Co.

President National Machine Tool Builders' Association

the administrative mind to the needs of the moment. The United States, become overnight the leading nation of the world and the last bastion of free enterprise, hemmed round, as it is, with an iron curtain which shields a ruthless and scheming enemy, can ill afford to risk, through inadequate or obsolete productive capacity, the very foundation of its defense potential.

If this is to be avoided, our nation must somehow develop a continuing recognition of the vital import to its own safety and welfare of a thriving and vigorous machine tool industry. In the light of these considerations, it is a shocking fact that machine-tool manufacturing is perhaps the classic example of the cyclical feast or famine, boom and bust industry. The machine tool builder occupies a unique but not very enviable position. Between cyclical spurts of industrial activity, he becomes the forgotten man, engaged in a life-and-death struggle with a private depression of his own. Sometimes this occurs when the consumer goods industries are enjoying a boom of no mean proportions. Then as he battles to meet a dwindling payroll, he is greeted with headlines in every morning paper to the effect that the business index has reached a new high. It is not easy to avoid an inferiority complex under such conditions, or even to wonder with wry and nostalgic irony how an industry which only a few short months before was being proclaimed the very cornerstone of the nation's security, could be allowed to fall upon such evil days!

### Machine Tool Industry

It was in such an atmosphere of distress that the machine tool industry heeded its call to the colors the second time within a decade when our troops entered Korea in June, 1950. But the memory of its trial by fire, which it had met with distinction during World War II, was fresh in the minds of machine tool builders. They understood the task before them, and the pattern of their needs was clear. Essentially these were threefold: immediate priorities for materials; assistance and protection in recruiting manpower; and money and credit for working capital. What is more, an effective administrative organization had finally been developed, after several false starts during World War II, in a War Production Board. It should have been obvious enough and relatively simple, as such things go, to reactivate a WPB without undue delay.

The sad saga of what happened has been told too often to need repetition here. Suffice it to say that the lessons of World War II appeared to have been forgotten, and so they remained for nearly fourteen months before vigorous and effective action was taken to stimulate machine tool production. In the interim, the industry did its best to lift itself by its boot straps, more

than doubling its production and laying the groundwork for further doubling and redoubling.

Then, as usual, the machine tool builder was "rediscovered" by congressman and senator, by reporter and publisher, by columnist and investigator, and, not least of all, by tax collector and renegotiater. Once again one read of the "booming" machine tool industry and its "record profits." And unless history, God willing, shall fail to repeat itself, this industry, thrice the saviour of our nation within the memory of millions of persons now alive, once more will be bled white through taxation and renegotiation of the discounted earnings of future years on a current income basis. Then this crucial industry will again subside into an oblivion from which a dangerous number of its members always find themselves unable to rise because the ravages of an unrealistic tax policy have deprived them of the reserves necessary to survive the inevitable drought.

What is wrong with this picture, and what is the solution to the problem? Certainly it is not subsidy. The typical machine tool builder qualifies as a small businessman within the statutory definition of that term. He probably employs not over 200 persons. His business,



likely as not, started on a shoestring many years ago, and his capital is strictly the fruit of earnings ploughed back into his business during those alternate cycles when income exceeded outgo. Businessmen reared in this atmosphere do not take kindly to subsidy. They are the soul of rugged individualism. But they are apt to have a highly developed sense of justice and of the fitness of things, too. Small wonder that they smoulder with resentment over a national policy which, through recurrent emergencies, periodically compresses, say, a decade of production into a year or two, then taxes the returns at excess profits tax rates, and finally renegotiates away all but a pittance—perhaps 1 or 2 per cent-of the balance. Small wonder, too, that they take a dim view of a depreciation policy which, for tax purposes, stretches the useful life of capital equipment to the elastic limit, forcing them to wait an unrealistic interval of fifteen to thirty years to recover their capital investment out of earnings, and deprives them altogether and permanently of those installments of the annual recovery which happen to fall into loss years.

Nor can the machine tool builder be stirred with patriotic fervor when he finds his peace-time markets, after one of those orgies of production for which, believe me, he has no desire, scuttled by a careless and precipitate dumping of government-owned surplus machinery.

Nor, if by chance he has survived all of these ordeals, can he be expected to rise up and cheer a foreign policy which subsidizes his European competitors with his own tax dollars and then effectively prevents him from selling his own goods in the foreign market, which, until the advent of the Marshall Plan, had historically averaged about 25 per cent of his sales.

The problem of ironing out the hills and valleys in the machine tool builders' curve is a difficult and complicated one at best. Its accomplishment will call for the best brains, the utmost cooperation, and the most unremitting effort on the part of the industry, economists, and Government alike.

It would be presumptuous to claim competence to prescribe a panacea; it is not too difficult, however, to discern some of the areas of attack which should be made on this problem.

At the 1952 Spring Meeting of the National Machine Tool Builders' Association the following program was suggested, in an address made by the writer, as a start in the right direction:

1. The federal tax laws should be modified to permit rapid and complete recovery of capital invested in industrial plant and equipment. Such a step would provide a tremendous stimulus to keeping plants equipped with up-to-the-minute machinery. Furthermore, it would tend to iron out the swings of boom and bust in capital goods, one of the most cogent contributions to periodic depressions.

2. In renegotiation of earnings, the principle of carry-back and carry-forward, already an established feature of federal tax laws, should be recognized, so that the machine tool industry will not find itself financially prostrated by the period of depression which follows every era of arming for national defense.

Furthermore, the Government should recognize that the machine tool industry must be allowed to earn enough in periods of high production to provide adequate financial reserves against the days of subnormal activity which inevitably will follow.

3. Our Government should maintain a permanent reserve stock of machine tools, in the same manner as it now keeps tanks, guns, and small arms in reserve for the hour of need.

4. A uniform procurement policy should be adopted for all agencies of Government with respect to machine tools, to be worked out in cooperation with the industry and its distributors. Such a program would eliminate costly delays in ordering vital equipment in time of sudden emergency.

5. A complete stand-by pool order program should be adopted and checked annually so that in an emergency, the machine tool industry could swing into immediate production for defense. Pool orders should provide for financing or advance payments when needed.

This M-Day Program should include provision for priorities on materials and manpower. The executive and administrative organization and procedure for a National Production Authority or a War Production Board should be established on paper in advance. In the next emergency, we should not have to start at scratch all over again or scuttle the lessons of the past.



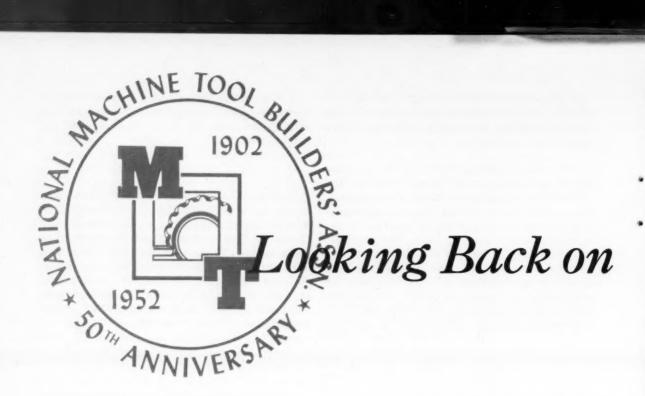
- 6. Our Government should call a halt to subsidizing foreign competition in the United States domestic machine tool market with the United States taxpayers' dollars.
- 7. A long-range public relations program should be conceived and carried out by the Association, aimed at acquainting the Government as well as its citizens with the fact that a strong machine tool industry is essential to the maintenance of a strong nation. The emphasis in such a program should be upon the nation's needs and not our own, which are simply incidental to the national welfare. Perhaps we should adopt a slogan and plaster it across the nation, maybe something like "Machine Tools—Key to the Nation's Defense and Prosperity."
- 8. We should work for the establishment of a permanent machine tool commission, cooperate with it, and if possible enlist its support of our general program.

The last of these proposals has taken form in the recently established Committee on Productive Capacity under the chairmanship of Harold S. Vance, president of the Studebaker Corporation. Needless to say, this Committee will receive the utmost cooperation from the National Machine Tool Builders' Association. It is earnestly to be hoped that its deliberations will result in the first broad-scale attack on the problems of this vital industry.





Presidents, Vice-Presidents and Treasurers of the National Machine Tool Builders' Association are changed with each annual meeting, but the officers who carry on the day-by-day activities remain the same year in and year out. Tell Berna, General Manager, has served in that capacity for fifteen years and Frida F. Selbert has been Secretary of the Association for twenty-four years. Mr. Berna is a graduate of Cornell University and has been connected with the machine tool industry for thirty-one years. Mrs. Selbert is a graduate of the University of Cincinnati, College of Business Administration.



TIKE other American enterprises which at the turn of the century stood on the threshold of the greatest industrial expansion the world has ever known, the business of building machine tools had its share of growing pains. Many shops building metal-cutting



machinery had sprouted up during the 1890's, principally over New England and the Midwest. In the quest for new business, rivalry was keen and unbridled. Jealousies prompted firms to take orders on any terms, with little regard to the economic consideration involved in arriving at a fair selling price, and with little compunction over pursuing questionable business practices. Ignorance of competitors' policies brewed fear and distrust, and the demoralizing atmosphere impeded the growth of the industry at a time when unprecedented opportunities were almost at hand.

Such a situation could not long exist without disturbing some of the more progressive minds

among the machine tool builders. One of these visionaries was William Lodge, president of the Lodge & Shipley Machine Tool Co., of Cincinnati, Ohio, which by 1900 had emerged as a leading lathe manufacturer. Mr. Lodge assumed the initiative in calling together seventeen builders of lathes, in the spring of 1902, to discuss their mutual problems. The following seventeen companies were represented at that meeting, which was held in the old Waldorf-Astoria Hotel, in New York City:

American Tool Works Co., Cincinnati, Ohio P. Blaisdell & Co., Worcester, Mass.
Bradford Machine Tool Co., Cincinnati, Ohio W. P. Davis Machine Co., Rochester, N. Y.
Draper Machine Tool Co., Worcester, Mass.
Fairbanks Machine Tool Co., Springfield, Ohio Flather & Co., Inc., Nashua, N. H.
Greaves-Klusman & Co., Cincinnati, Ohio Hamilton Machine Tool Co., Hamilton, Ohio Hendey Machine Co., Torrington, Conn.
R. K. LeBlond Machine Tool Co., Cincinnati, Ohio

Lodge & Shipley Machine Tool Co., Cincinnati, Ohio Prentice Bros., Worcester, Mass.

Rahn, Mayer & Carpenter Co., Cincinnati, Ohio F. E. Reed Co., Worcester, Mass.
Schumacher & Boye, Cincinnati, Ohio

Springfield Machine Tool Co., Springfield, Ohio



## a Half Century of Service

The subject of pricing figured prominently in the discussions, and in view of heavy increases in the cost of labor and material, it was generally agreed that in the future it would be healthier all around for each company to give more attention to these factors, and to worry less about the selling prices of competitors. At that meeting it was soon realized that the problems of lathe manufacturers were not much different from those besetting manufacturers of other metal-cutting machines, and so the next few months were spent in crystallizing this mutuality of interest into an association that would include all machine tool builders.

Twenty-eight charter members were present at the first annual convention of the National



Machine Tool Builders' Association, held in Cleveland, Ohio, on October 14 and 15, 1902, just fifty years ago this month. The purpose of the new Association as stated in its constitution was "to promote the interest of the machine tool builders in the direction of good fellowship and



liberal discussion pertaining to the manufacture and sale of machine tools." It was in no sense an attempt to create a trust or combination. Many years later (1948), the constitution was amended to extend membership to manufacturers of power-driven metal-forming equipment, such as that used to press, forge, emboss, hammer, blank, or shear metal.

The officers elected for the first year were: President, Joseph Flather; first vice-president, William Lodge; second vice-president, W. P. Davis; treasurer, Enoch Earle; and secretary, P. E. Montanus.

Good fellowship, being one of the tenets of the constitution, gained expression in social affairs that were a feature of every early convention. Many events in those days were sponsored by Alexander Luchars, founder of MACHINERY, who enjoyed a wide acquaintanceship throughout the entire machine tool industry. Before World War I, most of the annual conventions were held in New York City, and MACHINERY'S archives reveal interesting accounts of the get-togethers that followed the business of the day. After a tally-ho ride (1903), and the thrill of a trip on the city's shiny new subway (1904), the outings followed more or less a similar pattern: a boat ride in the Sagamore up the Hudson or around the Narrows or out on Long Island Sound, then a picnic, ball games, and races. Many of the names of those attending the outings continue to be well-known

to the present day. In the account of the 1908 outing at Point View Island on the Sound, for instance, the write-up of the sporting events mentions such recognizable participants as Kingsbury, Merryweather, Jacobs, Eberhardt, Gorton, Ingersoll, Spencer, LeBlond, Besly, Bullard, and Billings.

From the very beginning, however, the meetings of the Association were primarily concerned with the solution of serious problems. An item on the agenda at the first convention was the consideration of a bill before Congress that would convert the United States to the metric system of measurement. After several speakers explained how highly impractical and expensive conversion would be for the machine tool industry, and ultimately for the consumer

Program for an evening of entertainment at one of the early meetings of N.M.T.B.A., printed in the form of a shop operation sheet.

### Operation Sheet MACHINERY'S INNING, Hotel Astor, New York, October 10th, 1911 The movable stage is a mechanical feature worth noting. When not in use this is raised out of sight by electrical machinery and replaced by bones similar to the others. STARTING UP . . . . , CUTTING OFF the Intermission. . . . . Overture by Orchestra . . Overture by Pinto's Orchestra . . . , . Mr. J. M. Winnie GRINDING the Organ INSPECTING THE HOPPERS. This calcirated organ is played by discrincity through a cable attached to a huy-beard that can be placed anywhere in the ball-room. Tonight the key-beard in on the floor just the left of the stage. The second is distributed through the frances on the oldes of of the ball-room, instead of through visible pipes in the usual way. Royal Moskovitzskis Russian Dancers RELIEVING the Hoppers with a Solo. . . . . . . Miss Mae Young DAY DREAMS—(rom "The Spring Maid") THE FOUNTAIN . MELODY IN F . 10th Operation CENTERING the attention on a song by Mr. Milton C. Snyder 3rd Operation: TURNING AND TUMBLING . . Ben Ali Hassan's Berber Arabs DRINKING SONG . . . . . . . . . Rice 11th Operation GAGING the vocal range of a Sextette . . . The O'Conner Sisters LINING UP for a Farce TAKE'S UNIVERSAL BORING by a new process—Chips of All Kinde . . Mr. John Dillon A Mechanical Farce in One Revolu Written by Em lav Staged by Jean Barrymore. PLACE-Herrmann's Germania Garden, Cincinnati. FACING the Prosperity Seekers with a Musical Sketch TIME-August, 1911-Evening THE MUSICAL MACHINERY MERCHANTS CAST Mr. Joan Barrymore Mr. J. M. McKenna Mr. William Stoole Mr. Thomas Misray PLACE-Office of the Great Eastern Tool and Supply Co. TIME-October 10th, 1911 TAKE WURZBURGER HERMANN WEINGARTNER SAM SELIUM DICK CRABEM CAST Singers, Municians, Waiters and others FINISHING with a General Jollification MACHINERY'S WELCOME SONG Sance and Music and Goodfellowship Choruser Air, "Marching Through Goorgin FEEDING new stock into the Mechanisms Hurrahl Hurrahl We give them three times thre Hurrahl Hurrahl it schoos clear and free— And mingles with the choese of a mighty industry When we all gather together. Music by PINTO'S ORCHESTRA Stage Direction by T. ARTHUR BAKER MISERERE.H. TROVATORE - Vardi GARDEN OF MY HEART-Boll SEXTETTE FROM LUCIA-Dominatio OILING UP AND LUBRICATING during Intermission of 20 Minutes.

too, the convention adopted a resolution protesting enactment of the bill. This was the first concerted effort of the machine tool builders on a matter of common interest.

The advantages of standardizing the design and dimensions of certain elements of machine tools came to the fore early in the life of the Association. In a paper read by Mr. Lodge at the 1903 convention, he advocated standardizing lathe design to the extent that would permit interchangeability of faceplates, chucks, and tool-holders among the various makes then on the market. Thereafter, the matter of standardization was given constant attention by the Association-standardization of the speed range of variable-speed motors, standardization of the mountings of motors, standardization of the T-slots in machine tables, standardization of milling machine spindles, and even standardization of paint color, by the adoption of "machine tool gray."

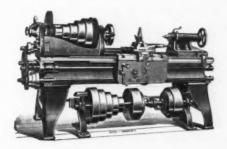
The sound economics inherent in standardization which accrues to the machine tool builder and user alike, continues to this day to figure prominently in the thinking of the Association. Its activities in this respect are now coordinated with those of the American Standards Association, of which N.M.T.B.A. is a member. Standardization of business practices among the machine tool builders has been another objective of the Association, and standard costkeeping systems and sales contracts have been developed.

In the early meetings, the convention rostrum was frequently occupied by speakers who would decry some particular business evil of the day. One early abuse, for example, was the practice of a dealer who, anticipating an uptrend in business, would place an order for new machines with a manufacturer. Then, when the expected new business failed to materialize, the dealer would arbitrarily cancel the order, leaving the manufacturer "holding the bag." Such speculative activity, in a business which by nature was feast or famine anyway, inevitably led to the early demise of small companies.

As time went on, the Association concerned itself with other aspects of business—freight rates, patents, tariffs, credits, taxes, and production and personnel relations. World War I set the stage for the influx of women into the industrial life of America. The impact on the machine tool industry of this social revolution can be realized by reviewing the published "Proceedings" of the N.M.T.B.A. meetings of that period. One can hazard the guess that the pres-

ence of women in the factory had, consciously or unconsciously, given impetus to the design of machine tools that were safer and easier to operate.

Marketing and selling problems have constantly been a major concern of the Association. Prior to World War I, attention was focused on foreign markets, and members were encouraged to set up and maintain effective sales and service organizations abroad. Soon, approximately 30 per cent of the American machine tool output annually entered export channels, principally those to Europe. Germany had appeared on the scene as the chief competitor, so when the Allied blockade effectively cut off the Central Powers from South America, that market, too, was thrown open for the first time.



American machine tools figured decisively in crushing the Prussian juggernaut, as was evidenced by the tremendous increases in shipments in the 1914-1918 period. With World War I over and the 1921 depression a thing of the past, the foothold already established abroad by American machine tool manufacturers enabled them to obtain a goodly share of the world's markets. That they were able to do this in the face of keen competition from low labor-cost European machine tools, and often under a highly restrictive tariff, is a tribute both to the general excellence of the American product and to the efficiency of the sales promotional work of the Association.

During the lean thirties, promotional work appeared in the form of Association-sponsored market research and institutional advertising campaigns. To survive the downward selling price spiral of their commodities, users of machine tools were vigorously and continually reminded of the soundness of reducing production costs by replacing obsolete equipment. At the same time, the Association gave no quarter

to the pseudo-economists prominent in public affairs who by their utterances branded themselves as disciples of the "no technological innovation—no unemployment" school.

Four great expositions of machine tools have been held for prospective buyers, under the auspices of the N.M.T.B.A.—in 1926, 1928, 1935, and 1947. Visitors from all over the world were attracted by improved and unique machine tools that were exhibited for the first time at each show.

Education-wise, encouragement has long been given to training at all levels in the machine tool builder's organization. As far back as 1907, a standard apprenticeship contract and diploma were adopted. The need for training junior



executives who would perpetuate the ideals of the founding members was also stressed. In recent years, the Association, in collaboration with the American Machine Tool Distributors' Association, has sponsored a series of summer conferences for sales engineers at Cornell University and Purdue University.

Without reservation, the most noteworthy achievement of the American machine tool industry was in its concerted efforts, within the framework of the N.M.B.T.A., in retooling the free world for the attainment of victory in World War II. The industry, virtually overnight, had to first double its annual peacetime output, and then go on to increase it sevenfold. And all this had to be done before planes or guns or tanks could roll off production lines in the desperately required numbers. In retrospect, this accomplishment seems to have been all the more meritorious when it is remembered that these achievements came in the wake of serious curtailments in the sources of skilled labor and vital materials. One joint project of the Association was to give to the War Department complete and tested designs for shell machines that could be produced in shops not otherwise engaged in the war effort.

With the demands satisfied for machine tools needed in the production of war materiel, the industry found itself working at a fraction of its expanded capacity by 1944. The Association then was instrumental in obtaining permission to start the production of machine tools for the post-war civilian market in cases where activity did not interfere with the war effort. It was contended that an orderly transition from a war economy to civilian economy could thus be effected, and with a minimum amount of industrial disturbance. The Association also sought a just and equitable disposal of surplus government-owned machine tools to those plants that could absorb returning workers in the greatest numbers.

Prior to the Korean outbreak, the machine tool market had once more returned to a highly competitive condition. Sales were slow, and the Association expended its energies in breaking down the inertia that was delaying the rehabilitation of many plants. User-education campaigns were aimed at dispelling the lack of understanding in the "front office" of the high cost of obsolete machine tools. No punches were pulled in the outspoken remarks of speakers before the convention meetings in condemning the obstacles which the Government put in the path of prospective business-obstacles in the form of unrealistic tax laws governing depreciation, and in the form of regulations that stymied capital reinvestment, by requiring distribution of a large share of current earnings as dividends.

With the crossing of the thirty-eighth parallel by North Korean troops, the business of building machine tools reverted to a war footing. The



industry was smaller, in number of plants and workers, than at the entry of the United States into World War II. At that time, it will be remembered, the machine tool builders had already been at work for two years equipping our future allies. Furthermore, in 1950 the industry had been experiencing a declining market for nine years, and was in no position to finance a drastic increase in production.

Yet in a few short months, the machine tool builders experienced a turnabout in the demand for their products, and backlogs began to pile



up. True, many orders were not war orders, but were long-postponed replacement orders which had been precipitated by the fear that the Korean crisis would create machine tool shortages. Coupled with this was the reluctance of the industry to plunge headlong into any program of expanding plant facilitates, since the troubles of reconversion after World War II were still fresh in mind. And the national emergency meant that again the industry would be dealing with many individuals in governmental agencies who were only remotely aware of, or sympathetic to, its problems.

The work that the N.M.T.B.A. had before it was clear—to make it possible for machine tool builders to again demonstrate their unflinching patriotism through round-the-clock production. Difficulties in obtaining priorities for raw materials had to be ironed out, the Government's machine tool requirements had to be understood, the efforts of different manufacturers had to

be coordinated, labor had to be recruited and trained, pool orders had to be arranged, and full use had to be made of the services of available sub-contractors.

The Association has used its offices for the missionary work of driving home to governmental agencies the feast-or-famine nature of the machine tool industry—that an equitable program of renegotiation cannot divorce the profits made during a period of military production from the losses sustained when the emergency is over and when the tools built for the defense of the country glut the market.

Fifty years' service rendered by the National Machine Tool Builders' Association—service that has been documented for all time to come in the productivity miracles of the modern machine tool—has been a vital factor in elevating our standards of living and in contributing to our national security. The heritage of the past is a guidepost for the future!

Below: A seat and pedals came with lathes at the turn of the century. Handle bars came with the operator's mustache.

Right: Early portable power tools looked like Rube Goldberg designs.



### PORTABLE POWER TOOLS



### Machine-Tool Building and Electrical Manufacturing

(Continued from page 163)

generation ago, there has been an amazing evolutionary progress in the application of electric power and control to machines. Without special controls, certain types of machines would not be in existence today.

Memories of the lineshaft, belts, single major motors, and pulleys may still be green, but we should not regard our forward march as a completed one. Increased productivity at lower unit cost is still a basic goal of modern industrial management. To attain this goal, manufacturing men must necessarily resort to programs of progressive mechanization. Both the electrical manufacturing and machine tool industries will have great stakes in such programs of the future, since they involve the replacement or modification of most machinery currently in use. Any improvement in production processes. any lowering of production costs, will expand both of our industrial markets enormously, because of the orders for necessary machine tools and the electrical equipment to drive and control them.

The basic idea behind progressive mechanization is that if increased productivity at lowered cost is to be achieved, then every plant operation must be constantly and rigorously examined, with a consequent replacement or drastic improvement of economically "old" or "worn out" machines. A machine that is fine today for its purpose will itself be successfully challenged in the future by a better machine—just as the introduction of carbide cutting tools made obsolete a great many machine tools. Despite the large capital outlay entailed, new equipment will be justified by reduced labor costs per unit of product, lower maintenance costs, fewer rejects, and the release of valuable floor space.

Sooner or later, every manufacturing man must ask himself such fundamental questions as "Are we wasting money on hand operations that could be mechanized?" "What operations are bottlenecks in my manufacturing cycle?" "How can I reduce my manufacturing cycle by the use of improved materials-handling methods and equipment?" "Are we allowing the lack of proper mechanization to reduce the efficiency of our operations?" "Where do we need a greater degree of automatic control?" And the manufacturer will call on the machine tool builder and

the electrical manufacturer for help on these points.

Many of the above questions obviously arise from our own experience in manufacturing. For example, one of G-E's divisions did considerable hand filing, burring, and polishing of small precision parts. Now these parts are finished in tumbling barrels, with resultant savings of \$50,000 a year.

Our backlog of mutual experience indicates that we should be able to meet the needs of American industry as promptly as they arise. Our unusual two-way relationship guarantees this; for while the machine tool industry has helped our precise and diversified manufacturing operation, we have worked ceaselessly through our application and sales engineers to better integrate electrical equipment with machine tools. Past progress by any one party alone would obviously have been impossible. Both electricity and machine tools had to be justified by that most critical of tests: the return on the invested dollar per man-hour. The tremendous development of both industries indicates how they passed this test.

Increased electrification is closely interwoven with the history of the machine tool industry for the past generation. The two simply cannot be disengaged from one another. Already electric motors account for 86 per cent of the total installed horsepower in American industry. This has been because electric drives can be "glove-fitted" to the individual requirements of machine tool operation. Breakaway torque, accelerating torque, running speed, ability to hold speed as the load changes—these and other drive characteristics are closely matched to the load.

Looking ahead into the future, progressive manufacturers throughout industry will strive to realize a new concept: the Age of Automatic Manufacturing. There will be a strong need for special-purpose engineering assistance if this type of thinking is to achieve realistic shape. Process type industries, such as the oil refineries and chemical manufacturing, are currently the closest to realization of this goal. Our own manufacturing plans and objectives are directed toward this end, when there will be a completely automatic operation from the presentation of work to the first machine right through to the completion of a packaged product.

Though people are anticipating this pushbutton manufacturing of the future, few of us are aware that it is already partially upon us. It is up to both our industries to collaborate in the realization of this great opportunity.

# PIONEER AMERICAN MACHINE TOOL BUILDERS



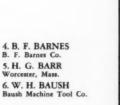
These photographs of the men who were then the leading American machine tool builders originally appeared in the September, 1903 issue of MACHINERY.







1. A. E. BAKER
Baker Bros.
2. WILLIAM BARKER
William Barker & Co.
3. C. H. BALL
Automatic Machine Co.















7. W. S. BAYLDON
Bayldon Machine & Tool Co.
8. E. A. BEAMAN
Beaman & Smith Co.
9. H. BICKFORD
H. Bickford & Co.







10. L. H. BINSSE Binsse Machine Co. 11. C. C. BRADLEY, Sr. The Bradley Co. 12. J. P. BROPHY Cleveland Automatic Machine Co.







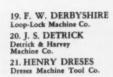








16. F. P. CARTER Carter & Hakes Machine Co. 17. C. M. CONRADSON American Turret Lathe Mfg. Co. 18. W. P. DAVIS W. P. Davis Machine Co.









22. J. B. DOAN American Tool Works Co. 23. ENOCH EARLE P. Blaisdell & Co. 24. F. L. EBERHARDT Gould & Eberhard













25. N. H. FAY
Fay & Scott
26. E. R. FELLOWS
Fellows Gear Shaper Co.
27. JOSEPH FLATHER
Flather & Co., Inc.















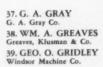
31. W. R. FOX Fox Machine Co. 32. WM. E. GANG Wm. E. Gang Co. 33. F. N. GARDNER Charles H. Besly & Co.







34. F. A. GEIER Cincinnati Milling Machine Co. 35. W. H. GLEASON The Gleason Works 36. GEORGE GORTON George Gorton Machine Co.















40. JAMES HARTNESS Jones & Lamson Machine Co. 41. JOHN J. HAY Milwaukee Machine Tool Co. 42. H. J. HENDEY Hendey Machine Co.

43. A. W. HENN National-Acme Mfg. Co. 44. M. P. HIGGINS Norton Emery Wheel Co. 45. CHAS, F. HILKER Hamilton Machine Tool Co.







46. F. W. HOEFER Hoefer Mfg. Co. 47. R. H. HURLBUT Hurlbut-Rogers Machine Co. 48. W. INGERSOLL Ingersoll Milling Machine Co.













49. CHAS. J. KNECHT The Knecht Bros. Co. 50. R. K. LeBLOND R. K. LeBlond Machine Tool Co. 51. HENRY M. LELAND Leland & Faulconer Mig. Co.















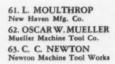
55. F. B. MANVILLE Fitchburg Machine Works 56. P. G. MARCH Cincinnati Shaper Co. 57. JAS. D. MATTISON New York







58. WILLIAM MERRILL Mitts & Merrill 59. P. E. MONTANUS Springfield Machine Tool Co. 60. M. MORTON Morton Mfg. Co.







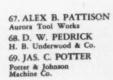








64. H. M. NORRIS Bickford Drill & Tool Co. 65. W. OESTERLEIN Oesterlein Machine Co. 66. W.M. H. OWEN Owen Machine Tool Co.









70. V. F. PRENTICE Prentice Bros. Co. 71. S. W. PUTNAM Putnam Machine Co. 72. A. D. QUINT Hartford, Conn.





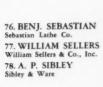








73. F. E. REED F. E. Reed Co. 74. FRANCIS REED Francis Reed Co. 75. EDWARD RIVETT Faneuil Watch Tool Co.















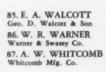
79. DWIGHT SLATE Dwight Slate Machine Co. 80. J. E. SNYDER Worcester, Mass. 81. GEO. F. STEWART Bradford Machine Tool Co.







82. R. STOCKBRIDGE Stockbridge Machine Co. 83. AMBROSE SWASEY Warner & Swasey Co. 84. A. H. TUECHTER Cincinnati Machine Tool Co.







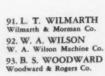








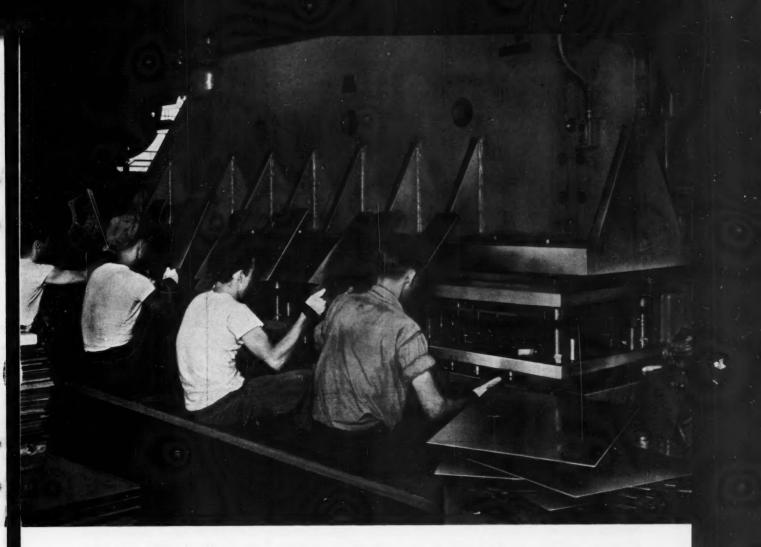
88. AMOS WHITNEY Whitney Mfg. Co. 89. D. E. WHITON D. E. Whiton Machine Co. 90. C. F. WIELAND Kempsmith Mfg. Co.











# Production Punching on Press Brakes

By W. EARL PETERS The Cincinnati Shaper Co. Cincinnati, Ohio

In the minds of many people, a press brake is a machine for making straight-line bends in sheet metal. Undoubtedly, such machines were originally designed just for this purpose. The word "brake," we are told, dates back to the old hand-operated machine for breaking the plant stems of flax so that the excess material could be combed out and the thread prepared. The original hand-operated leaf brakes for steel looked so much like the old textile tool that they were given the same name.

Aside from straight-line bends and a great variety of other forming operations, press brakes

are quite useful, and are widely applied for punching. There are many interpretations of the word "punching." In some instances, it means piercing holes. However, here it will be used in the sense of cutting sheet metal, whether it be piercing of holes, blanking outlines, notching of edges, or any similar operation.

Punching in brakes falls into two general classes—that done on a machine which is standard or very nearly so, and that performed on special machines with widened beds and rams. Standard machines are usually limited to a straight-line job, such as producing a line of

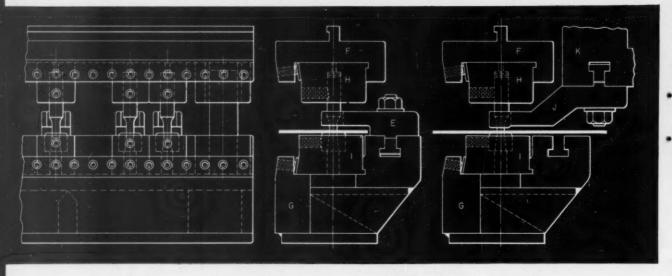


Fig. 1. Punch- and die-blocks (H) and (I) are held in bolsters (F) and (G) by set-screws, permitting the center distances between dies to be easily adjusted. With strippers (E), holes can be punched about 2 inches from the edges of sheets, but with strippers (J) the work can be passed through the press brakes.

holes in a bolted tank or along the edge of a cabinet sheet. Points to be considered in selecting a method of punching include the strength of the dies, the capacity of the press brake, methods of disposing of the slugs, arrangement of the die for adjustment of the center distances between punching units, and provision of proper stripping methods. An advantage of the press

brake is its ability to be quickly converted from punching to bending by removing the upper and lower bolsters as a unit and inserting a pair of bending dies.

A common and most useful arrangement for either general-purpose or special work of the straight-line type is shown in Fig. 1. Upper and lower bolsters, F and G, are provided with set-

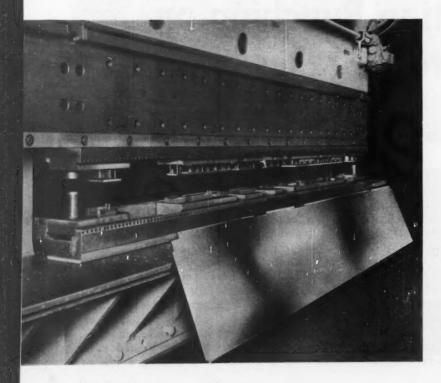
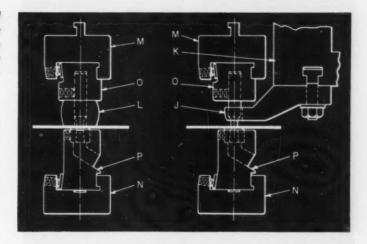


Fig. 2. Press brake equipped with combination dies and spring-loaded ejectors, employed for piercing and notching sheets for refrigerator cabinets.

Fig. 3. Slugs slide out the side of adjustable die-holders (P) in these set-ups. Cylindrical rubber strippers seen at (L) can be slipped over the punches for punching thin material.



screws for holding punch- and die-blocks H and I on adjustable centers. The set-screws are spaced closely enough so that at least two contact each block. This arrangement allows punching or notching of round or irregular-shaped holes at various spacings. With strippers of the type seen at E, holes can be punched about 2 inches from the edges of sheets. With strippers J suspended from a stripper beam K, work can be passed through the press brake, and holes can be punched anywhere in the sheet. Proportions of members in this design will vary greatly according to the work.

For extremely heavy work, the width of the slug disposal outlet in the lower bolster G is kept

to a minimum for strength. For more general use, and especially on thinner metal, this outlet is widened to 2 or 3, or even 4 inches. With the wider slug outlets, combination punching and notching dies with spring-loaded ejectors can be used. A die of this type used for piercing and notching refrigerator cabinets is shown in Fig. 2.

A different method of disposing of slugs is illustrated in Fig. 3. In this set-up, the slugs slide out the side of the adjustable punching unit P. This has certain advantages, in that the lower bolster N is both simple and low in cost compared with bolster G (Fig. 1). However, it has the disadvantage that the stripper shown

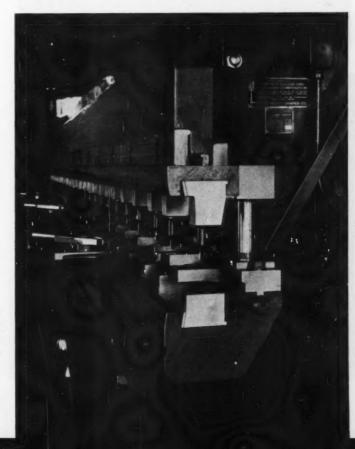
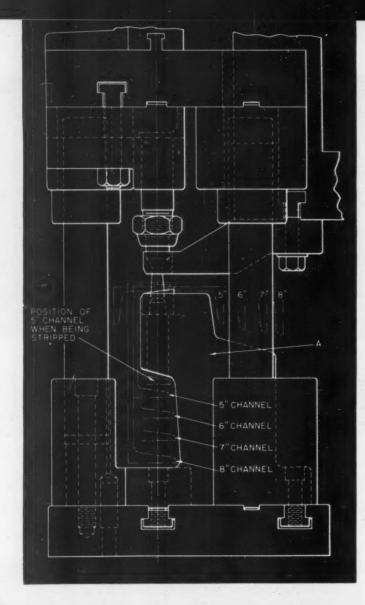


Fig. 4. Adjustable multiple punching die set up on a press brake for punching 3-inch angle-irons. Handoperated cam type clamps hold the work against the gages.

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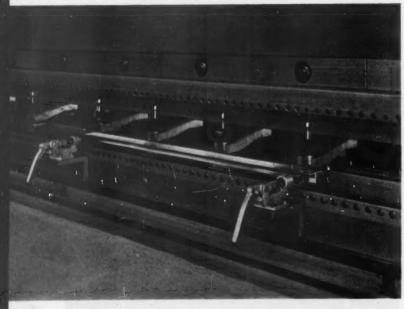


Fig. 5. Special die-block (A) is undercut so that 5-, 6-, 7-, or 8-inch channels can be punched in the same set-up. Smaller die-blocks and riser

blocks handle smaller channels.

at E in Fig. 1 cannot be used, as there is no method of attaching it. For work not thicker than 12 gage (0.105 inch), cylindrical rubber strippers as shown at L in Fig. 3 can be slipped over the punches. For thicker work, the strippers must be of the type shown at J.

Punch- and die-blocks H and I (Fig. 1) can be made of special shape for punching angles or other rolled or formed shapes. Fig. 4 illustrates an adjustable multiple punching die designed for punching 3-inch leg angle-irons, with one leg turned upward. The guide pins are mounted on the rear so that the angle-iron may be slid along the die. In this way, angle-irons longer than the die can be pierced. The minimum distance from the back face of the angle-iron to the center lines of the pierced holes is governed by the length of the stripper, and the stripper can actually be used as a gage. Such a die can be manufactured with a shut height very little less than the die space on the machine, and can be made to serve for larger angle-irons by using longer punches.

A special die-block A is used in the set-up seen in Fig. 5 for punching holes in 5-, 6-, 7-, or 8-inch channels. Riser blocks and a smaller die-block are employed for punching holes in 3- and 4-inch channels on the same press brake.

Various types of hand or poweroperated clamps can be used to hold the angle-irons against the gages. Heavy hand-operated cam type clamps are employed for the set-up seen in Fig. 4, while light quick-acting toggle clamps are used to grip the T-section shown in Fig. 6.

Fig. 6. Quick-acting toggle clamps are used to hold a T-section against the gage-block in this punching setup on a press brake.

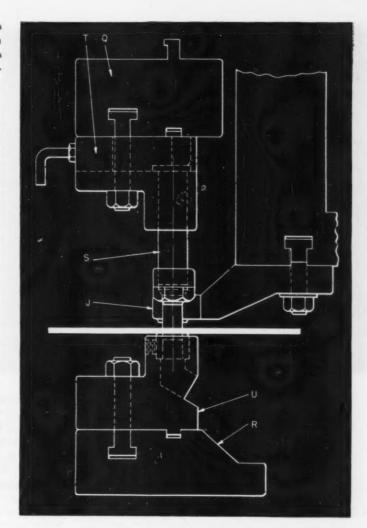
Fig. 7. When the gag-block (T) is pulled to the left, the punch held on the lower end of stem (S) by means of a coupling nut becomes inoperative through "gag control."

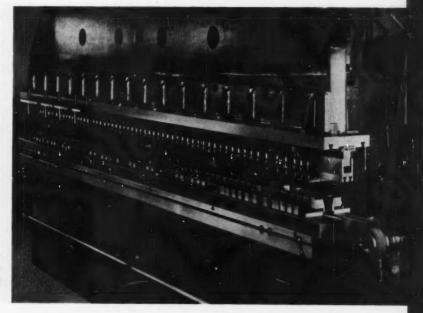
Still another method of straightline punching in a press brake is illustrated in Fig. 7. A feature of this method is "gag control," which permits making any of the punches inoperative. This is accomplished by pulling gag-blocks T outward. Punches gagged in this way simply rest on top of the work surface when the ram is lowered. This arrangement is particularly useful in punching large work such as freight car parts, trailer body sheets, etc., where it is necessary to punch a full row of holes along one side and only a few holes along another location. It is also useful for piercing holes in angle-irons used for hightension electrical towers, punching staybolt holes in boiler sheets, etc.

The only kind of strippers which can conveniently be used with an arrangement such as that shown in Fig. 7, are those mounted on a stripper beam. This type beam is mounted on horizontal guides on the inside of the press brake housings, thus permitting the work to be passed through the brake.

The simplest and cheapest punch is the straight shank type, secured in the punch-block by set-screws as seen in Figs. 1 and 3. For punching thicker work, it is often advisable to secure the punches to stems S by means of coupling nuts, as seen in Figs. 5 and 7. Punches with heads are seldom employed because of the difficulty in changing punches. The bearing area on top of the punch (or under the die bushing) must be sufficient to prevent sinking into the holder. This condition sometimes necessitates the use of heads on the punches or the hardening of supporting areas in the holders.

Fig. 8. Unique double-row die set-up on a press brake, in which slugs from the two rows of lower dies fall inward onto a conveyor belt.





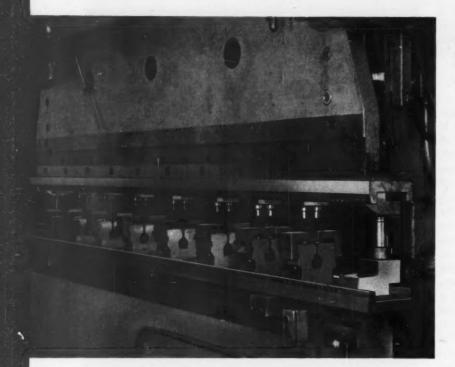


Fig. 9. Bulb-shaped tees of the type used for European railroad cars are punched on this doublerow press brake die. Work-pieces are fed into die from the side.

Various combinations of the bolster, block, and stripper arrangements shown in Figs. 1, 3, and 7 can be devised. For example, upper bolster F and punch-block H (Fig. 1) can be used in conjunction with die-block P and lower bolster N (Fig. 3), or vice versa. Also, when bolsters F and G (Fig. 1) are longer than stripper beam K—which is limited by the distance between the housings on the press brake—strippers E can be used at the outer ends and strip-

pers J between the housings. Standard press brakes will usually have sufficient shut height for the die arrangements shown in Figs. 1 and 7. However, with the set-up seen in Fig. 3, a vertical die opening greater than standard is generally required.

The punching arrangement shown in Fig. 3 lends itself to many special variations, such as double-row dies. Fig. 8 illustrates a novel use of this method of punching—using the gag con-

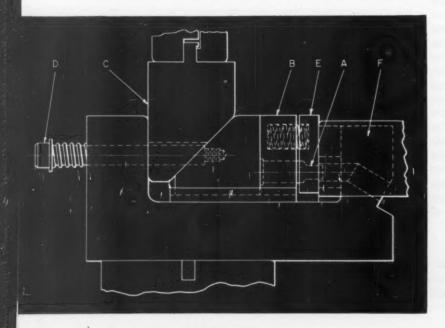
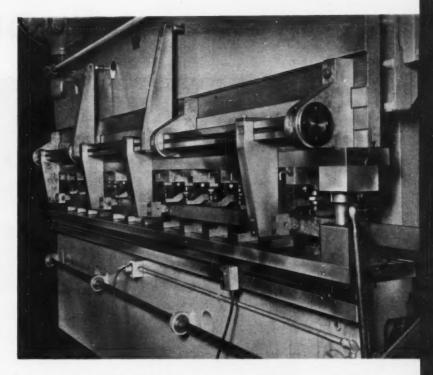


Fig. 10. Set-up used on a press brake for side punching. Punches (A) are driven to the right by the action of cam-block (C) on tapered back face of block (B).

Fig. 11. Heavy clamping of channels is obtained with this airoperated pivoting arrangement. In this set-up, the work can be loaded from front of press brake.



trol scheme, and disposing of the slugs from the two rows of lower dies inward onto a motor-driven conveyor belt. Stripping is by a spring-operated beam which limits usefulness to work 3/16 inch thick or under. This die is used for multiple punching of 5/32-inch thick, steel "carlines" (ribs of railroad cars), and the side and roof sheets of the same cars. Various combinations of holes can be punched by gagging certain tools. Center distances between dies are also adjustable. Fig. 9 shows a double-row die for punching bulb-shaped tees.

Side punching can be accomplished on press brakes with a cam-actuated, spring-loaded arrangement such as the one shown in Fig. 10. Punches A held in blocks B are moved to the right to pierce the work when cam-blocks C move downward with the press brake ram. Spring-loaded studs D, screwed to the punchblocks and passing through slots in the camblocks, return blocks B to the left when the ram rises. Spring-loaded pads E strip the work-piece from the punches, and the punched slugs fall from an opening in the side of die-block F.

Fig. 11 illustrates a novel set-up, with provision made for extremely heavy clamping of the structural channel to be punched. The clamping arrangement is suspended from the press brake ram, and pivoted by means of pneumatic cylinders (mounted on back of the ram and not shown) that are controlled by limit switches. The clamps are swung outward from the work to permit loading from the front of the press

brake. When the ram descends, the clamping rollers are automatically pivoted inward to firmly grip the work-piece. Slow, endwise loading is thus avoided. This press brake is equipped with two sets of quickly interchangeable punching blocks for piercing structural channels ranging from 3 to 8 inches, and angles up to 5 by 5 inches. Parts are now completed in one-fifth the time required previously, resulting in substantial cost reductions per piece.

The dies shown in Fig. 1 can also be used with solid lengths of punch- and die-blocks H and I arranged for certain specific purposes—such as punching a row of holes on 2-inch centers for a tank sheet. When such sheets are completed, the blocks can be withdrawn as a unit and general-purpose punching dies can be inserted in the bolsters. This same scheme will allow the use of quickly interchangeable solid units for various models and sizes of cabinets, as well as similar work.

For high-quantity production runs, complete die set-ups as shown in Fig. 1 are frequently made for a certain size cabinet. The die is left set up for a season or two, or as long as the cabinet model is required. A series of these complete dies are kept on hand. Then when a model change is required, the bolsters are easily adapted to the new job. There are instances of refrigerator punching bolsters which have been in use for over fifteen years, it being necessary only to change the punching and notching units as occasion required.

# Sealing Pressurized



By S. P. HESCH
Materials and Process Engineer
Anaheim Division
Northrop Aircraft, Inc.

PRECISION instrument making calls for exacting and carefully controlled manufacturing operations, particularly where an optical system is involved. This is because of the need to maintain the internal mechanism of the instrument in an atmosphere of pressurized gas, in order to keep lenses and other critical parts permanently clean and film-free under all conditions of service. What complicates the manufacture is the widespread use of castings—with their inherent porosity—for many of the elements in these instruments. How cast material is made impervious to the passage of air and gas by a process of impregnation is the subject of this article.

One such instrument, an optically operated gunfire control device, is being made at the new Anaheim, Calif., plant of Northrop Aircraft, Inc., for the U. S. Ordnance Corps. Prior to delivery, the instrument is internally pressurized with nitgrogen gas at from 3 to 5 inches of mercury. The gas pressure must be permanently

retained; any leakage will soon permit air to enter the instrument, causing an accumulation of moisture and a filming of the lenses.

A number of intricate steel and aluminum castings are required for each gunfire control instrument. Sand, die-, and permanent-mold castings are used, and it is highly important that the gas pressure built up in the finished instrument will not be diffused during its lifetime. Impregnation requires that all surface finishing operations be performed in a specified order.

Aluminum castings, for instance, are first cleaned, and to increase their resistance to corrosion are anodized for fifty minutes by a sulphuric acid treatment. (Anodizing after impregnation might cause a loss of bond between the impregnant and the metal, thus allowing the impregnating material to fall out.) The castings are then rinsed thoroughly and immersed from ten to fifteen minutes in a solution of Sandoz "B" black metal dye. This dye imparts a dull black finish to the castings, thus cutting down

# Instrument Castings

internal light reflections in the finished instrument. The dye bath temperature is maintained between 160 and 180 degrees F.

Rinsing follows the dyeing, and then the castings are immersed in a "setting" solution of metal salts (cobalt or nickel acetate), also at a temperature between 160 and 180 degrees F. The purpose of the solution is to make the dye coating insoluble. This treatment is followed by another rinse, after which the castings are given a standard dichromate treatment to further improve surface corrosion resistance. After dichromating, the castings are baked for an hour at 240 to 260 degrees F. so that they are thoroughly dry for impregnating.

Although these operations are not actually part of the sealing operation, they are necessarily preparatory to it. As already stated, anodizing after impregnating might cause loss of bond between the impregnant and the casting material, and since the anodic coating applied has a high affinity for water, it is logical to immerse the castings in the water-soluble dye as the next step in the procedure. It is, of course, then practical to stabilize the dye coating in the metal salt solution. The final preparatory step, dichromating, gives maximum corrosion resistance even to those surfaces that are later to be sealed off by the impregnant.

Ferrous and copper castings are given black oxidized surfaces by an appropriate process to cut down reflectivity, but the preparatory treatment, unlike that of aluminum castings, need not be extensive. But like the aluminum castings, they are baked thoroughly for an hour at 240 to 260 degrees F. to remove all traces of moisture. After this final drying, all castings are ready for impregnating, and ordinarily need not be cleaned again. Should, however, additional cleaning be needed, an alkaline solution is used, after which the castings must again be thoroughly dried.

The sealing equipment at the plant consists of a series of medium-sized autoclaves in which the actual impregnating is done, reservoirs for the impregnant, cleaning tanks for removing excess impregnant from the castings, and ovens for polymerizing the impregnated material. The impregnant in current use is a conventional polymerizing type resin. This type of resin

Fig. 1. This battery of air guns is employed to shoot mastic compound into the gasket areas. works well except where copper castings make up more than 10 per cent of the batch, in which case a vinyl resin, not affected by the copper, can be used. Sodium silicate was formerly used for casting sealing but was abandoned in favor of the greater degree of permanency offered by the resins.

From an operating standpoint, the impregnating process is relatively simple. After pretreatment, cleaning, drying, and cooling (maximum cooling temperature must not exceed 100 degrees F.), the castings are placed in a basket and arranged in the pressure chamber of the autoclave in a manner so that all surfaces will be exposed to the impregnating material. The cover of the autoclave is installed and clamped over an air-tight gasket, as can be seen in the heading illustration. A suction pump is then

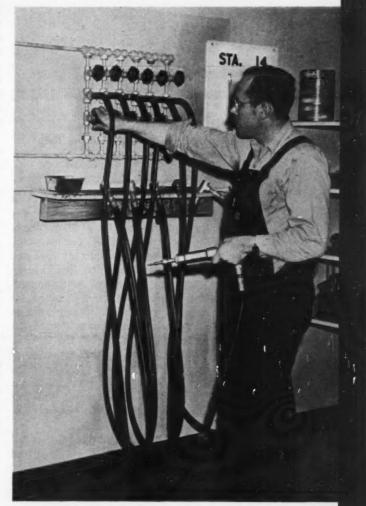




Fig. 2. The compound deposited around this instrument plate is sufficient to permanently withstand internal gas pressure without the use of a sheet gasket.

started, and the pressure in the autoclave is reduced to a maximum of 28 inches of vacuum.

This vacuum is maintained for at least twenty minutes, after which the valve between the pump and the autoclave pressure chamber is closed and the valve in the under-floor pipe line leading from the reservoir to the autoclave is opened. The difference between the normal atmospheric pressure in the reservoir and the vacuum within the autoclave forces the impregnant through the pipe line into the autoclave. After the level of the incoming impregnant is allowed to rise at least 6 inches above the uppermost casting in the basket, under the control of a level gage, the reservoir valve is closed, the vacuum valve is opened, and the autoclave is again evacuated to a maximum of 28 inches of vacuum.

This second vacuum is maintained for about five minutes, and then clean dry air is forced into the autoclave at pressures ranging between 60 and 100 pounds per square inch for a period of at least twenty minutes. During this interval, the impregnant is forced into even the most minute pores in the castings. Then the reservoir valve is reopened, the pressure in the autoclave forcing the impregnant back into the reservoir, after which all valves are closed and the pressure in the autoclave is returned to normal. Next, the autoclave cover is removed, the basket is lifted by means of a crane, and in a few minutes most of the excess impregnant on the surfaces of the castings has run off.

It is evident that the above procedure is highly effective: The initial vacuum draws a major portion of the air from the pores; the impregnant is introduced into the autoclave and covers the pores while they are still in a vacuum; and the pressure then applied over the impregnant forces the material further into the pores.

After the run-off, any impregnant still clinging to the surfaces is removed by immersing the castings in an alkaline emulsifying solution. This solution is agitated by air to speed the cleansing, and is held to about 120 degrees F. Rinsing follows, and then the castings are allowed to dry. Drying can be accelerated by directing clean dry compressed air over the work.

The final step in the sealing process is the polymerization of the impregnated sealant. This is accomplished by baking the castings for two hours at 225 to 275 degrees F. The oven may be brought to the baking temperature before the castings are placed in it. Following baking and cooling, the castings are examined for any exudation, or pore discharge, of the impregnant. Where this condition is found, the castings are immersed in a 7 per cent stripper solution for thirty to sixty minutes at 180 to 190 degrees F. After being stripped, the castings are given a three- to four-minute rinse in running water at room temperature, and are next pressure tested. They are then ready for the assembly line.

After assembly, the instruments go into the test room. Gasket areas, generally consisting of machined grooves, are then filled with a mastic gasket compound. This material is forced into the gasket grooves by means of pressure guns operating at about 2800 pounds per square inch. In Fig. 1 the battery of air guns used to shoot in the compound is seen. How the compound is introduced into a groove around the face fairing area of an instrument plate is shown in Fig. 2. No sheet gaskets are used.

Each assembly must undergo a vibration treatment on the equipment illustrated in Fig. 3. Any loose material soon falls from the instrument. After being pressurized with the nitrogen gas, the completed instruments are lowered by a hydraulic frame into a tank of water and care-

Fig. 3. This resonant beam vibrator loosens any excess material from the instruments.



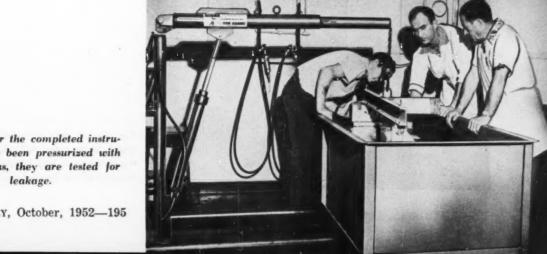
fully tested for leakage, as shown in Fig. 4. The slightest leak around gasketed areas or through porous castings can be detected. If leakage can be traced to a defectively sealed casting, the instrument is disassembled and the casting is reimpregnated. If a casting continues to leak after this second impregnation, it is rejected.

From the extensive experience of those concerned with the process of impregnating castings have come some worth-while suggestions. Copper bearing alloys should never be used in the fabrication of storage tanks and impregnating equipment, since the copper may affect the stability of the styrene impregnant. Instead,

uncoated iron or tinned metals are recommended. Mixing and baking areas should be well ventilated to prevent a dangerous concentration of fumes, and any condition that might cause static electricity should be guarded against. The fire hazards attendant to the use of styrene-resin mixtures are comparable to those of ordinary paint and varnish.

Personnel should use a protective hand cream, since the impregnant tends to remove the natural oils from the skin. Finally, the factor of cleanliness cannot be overemphasized. Clean castings, clean equipment, and a clean working area are absolutely essential if the impregnation process is to be successfully performed.

Fig. 4. After the completed instruments have been pressurized with nitrogen gas, they are tested for



MACHINERY, October, 1952-195

# Automatic Arc-Welding of

Use of Special Automatic Arc-Welding Machines Increases Production and Results in Better Joints with Higher Penetration than Previously Obtained with Hand Welding Methods

REELS for 10,000-pound winches, designed especially for truck and similar applications, are among products fabricated in considerable quantities at the Wayne, Mich., plant of Gar Wood Industries, Inc. Each reel consists of a steel tube into one end of which is welded a cast hub. Subsequently, two external flanges forming the ends of the winch drum are arc-welded to the periphery of the tube, one near each end, to complete this spool-like reel on which a cable is wound.

Before this assembly is fabricated, the tube is cut off to length, and the hub end is bored and chamfered. Also, several holes, including some for cable fastening, are drilled near the ends, through the 3/8-inch thick wall of the steel tube. No turning of the tube periphery is required.

However, the periphery of a steel hub is turned to fit inside one end of the tube, and the edge of this hub is chamfered at its outer face.

Before welding, the hub is forced into one end of the tube by means of a press. The chamfered edge of the hub forms a V-shaped annular groove which is to be filled with weld metal. A hiddenarc weld is made in this groove on the Cecil C. Peck automatic welding machine shown in Fig. 1. The machine is equipped with a single Lincolnweld head and is served by a 600-ampere Lincoln generator. Mild steel electrode wire 5/32 inch in diameter is automatically fed from a reel, and granular flux is deposited around the wire to cover the arc.

To bring the tube into favorable welding position, it is set on a pair of rollers whose parallel

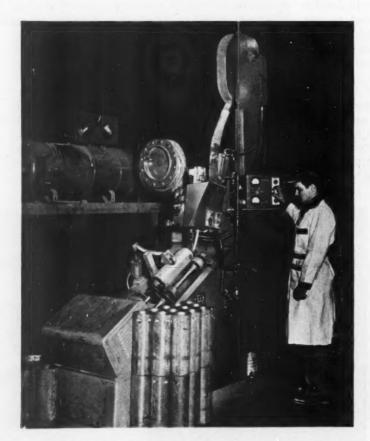


Fig. 1. On this automatic machine, which is provided with Lincoln welding equipment, hub flanges are welded inside ends of tubes for winch drums.

## Winch and Hoist Parts

By A. S. WURFEL
Machine Shop Superintendent
Wayne Division
Gar Wood Industries

axes are inclined at an angle of about 30 degrees. Flanges at the lower ends of these rollers position the tube longitudinally. Above the tube is a pair of narrower rollers suspended from a lever that is rocked by the plunger of an air cylinder. A slide to which the welding head is attached is inclined at an angle of about 15 degrees, and is moved up and down by the plunger of a second air cylinder.

The tube, with hub flange pressed in place, is put on the rolls, after which the operator opens a lever-operated air valve. This admits air to both air cylinders, and the one connected to the lever rocks the pressure rollers into position against the tube to insure a good ground. At the same time, the granular flux starts to flow, and the welding head moves down until the electrode

contacts the work-piece and starts the weld. At this instant, the roller supports start to rotate so that the work-piece is revolved as the weld progresses.

Welding is done at 500 amperes and 25 volts to insure excellent penetration as well as fast and uniform welding. Only fused flux adheres to the weld, and it is easily removed after welding. Unfused flux spills into a well below the work-piece and then onto a vibrator screen. All flux passing through this screen is elevated by a conveyor built into the machine, and is again fed into a hopper and then to the head. Particles of fused flux do not pass through the screen, but fall off into a waste box.

Only one man is needed to operate this machine, and about 150 circular welds are obtained



Fig. 2. Another automatic machine that makes two submerged-arc fillet welds, one inside of each circular flange fitted over tube shown in Fig. 1.



Fig. 3. Automatic welding is employed to join a hoist tube to a cast trunnion which is clamped by air against a rotating head.

per eight-hour shift. When each weld is completed, the current is shut off and the air-operated plungers are reversed to complete the cycle. The weldment is then unloaded by hand and passed to a second Peck welding machine, Fig. 2, for fastening the two external flanges to the tube.

This second machine is like the first, with similar welding equipment, except that the work is held in a horizontal position. Electrodes on the two welding heads are set at an angle of 45 degrees to make fillet welds between the tube and the inner face of each flange. In this machine, the tube is located between centers, one of which is moved by hand in loading and unloading the work-piece. Before the tube is loaded, however, two circular flanges (bored to fit over the tube) are placed on the tube, and are correctly spaced by resting in grooved rollers located above and below the work. The upper pair of grooved rollers is supported on a hinged frame that is rocked about pivots by the plunger of an air cylinder located on the right end of the machine.

Both automatic welding heads are supported on this hinged frame, and when the frame is rocked downward, the upper pair of grooved rollers presses against the flanges. This pressure insures good ground connections, and holds the flanges in tight rolling contact with the lower grooved rolls, which are driven to rotate the work as the welds are produced. Feeding the electrodes and flux is the same as in the first

machine. Excess flux falls into a well below a screen, as before, and is elevated for re-use.

Air clamping and flux feed start as in the first machine, just before the arcs are struck and rotation starts. In this case, two circumferential welds are produced simultaneously. The rate of production, however, is regulated to that of the prior machine, which makes only a single weld per piece.

Although similar in some respects to the first machine, the one shown in Fig. 3 does a different job, and is not equipped for automatic return of unfused flux to the hopper. Feed of flux from the hopper is automatic, of course, but the hopper is hand filled. In this machine—which can do a variety of jobs—the bed is set at an angle of 45 degrees, and the head is supported, independently of the base, from a horizontal beam along which the head can be traversed. If necessary, when loading and unloading large heavy parts which have to be handled by electric hoists, the beam with the head can be swung back to avoid interference.

In the set-up shown, the machine is being used to weld a steel tube, 7 inches in diameter and having a 5/16-inch thick wall, to a cast steel trunnion mounted on a rotating head. Before the tube is set in place, an annular groove is machined in the casting to fit the end of the tube. The welded assembly is part of the hydraulic hoist for a light-duty dump body which is also fabricated largely by welding in this plant.

Before welding, the end of the tube is pressed

into the chamfered annular groove. The space formed by the chamfer is filled with weld metal when the fillet weld joining the tube to the casting is made. A tapered plunger, moved by the ram of an air cylinder, is pressed into the end of the tube to hold and center the work as welding proceeds. A plate with a V-notch cut at its upper end supports the tube until it is clamped.

The welding head is adjusted so that the vertical electrode is directly above the joint where the fillet weld is to be produced. Flux starts to flow just before the electrode strikes the arc and the work starts to rotate. With this set-up, fifty-five to sixty welds are made per eight-hour shift, including loading and unloading time.

Still another automatic welding machine, Fig. 4, is being used effectively in this shop. This machine resembles a lathe, and is equipped with a variable-speed headstock and an airoperated tailstock, both mounted on a horizontal bed. The tailstock can be moved along the bed to accommodate tubes of different lengths to which flanges or end fittings are to be welded. The Lincoln welding head, supported on a horizontal beam, is arranged for traversing parallel to the bed, and can also be moved transversely a short distance. In addition, the head can be set with the electrode at any angle between ver-

tical and 45 degrees to the vertical. When set, however, the head remains fixed and the work-piece rotates.

Thus, a circumferential weld can be made in almost any position along a tube. In general, the tube is gripped by expanding chuck jaws which center the headstock end of the tube and rotate the tube at whatever speed is required to make the weld. The opposite end of the tube is supported on, and centered by, a conical tailstock which presses the tube against the face of the chuck as the center is forced axially inward by the air cylinder.

On this machine, a flanged head with a hub is welded to the same hoist tube shown in Fig. 3, and various other automatic circumferential welds are made. By varying the head speed, any desired speed of welding for different diameter parts can be obtained. Welds are commonly made with about 400-ampere current at 20 to 25 volts. Unfused flux drops onto a screen below the bed, and is automatically elevated to a hopper above the welding head.

Although much hand arc-welding is done in this plant, the automatic type is used wherever applicable. Such automatic welding is much faster than by hand, and superior welds, including better penetration, are obtained.

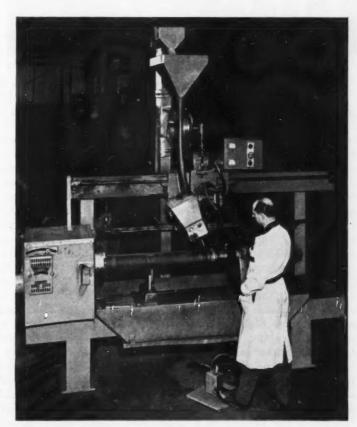


Fig. 4. On this welding machine the work-piece is held by a chuck on a variable-speed headstock and by an air-operated tailstock.



# Rocket on a

Venturi Ends on Motor Bodies for 3.5-Inch Bazooka Rockets are Now Completely Formed Cold in Six Progressive Operations on a Single 700-Ton Press

By R. E. HANSEN
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Production Engineering Sheet Metal
Oldsmobile Division
General Motors Corporation

AN important component of our effective anti-tank weapon—the 3.5-inch bazooka rocket—is the so-called "motor" which consists of a body loaded with the rocket propellant. The motor bodies are produced from SAE 4140 steel tubing approximately 2 inches in diameter, and with a wall thickness of about 3/16 inch. Precise manufacturing methods are necessary to insure that the lightweight bodies are strong enough to resist rupture. For this purpose, each body is subjected to two hydrostatic tests, applying internal pressures of 14,000 and 25,000 pounds per square inch.

When the Oldsmobile Division of General Motors Corporation, Lansing, Mich., was awarded a contract for the mass production of rockets, a careful study was made of existing methods of manufacturing each part. It was found that, with one exception, other producers were hotforging the motor bodies. This method entailed induction heating one section of the tube, hotforming the "trap seat" inside the body, reheating, forging of a tapered end on another press, degreasing, pickling, reheating, and finally, forging of the Venturi on a third press. Olds-

mobile also investigated a cold-forming method developed by Evans Products Co., Plymouth, Mich. As a result, Oldsmobile is now completely forming the Venturi ends of the motor bodies without heating the tubes, in six progressive operations on a single 700-ton press. An improved dimensional product is obtained due to cold-working, and much higher production rates are obtained at less cost.

Required lengths of tubes for the motor bodies are produced on Etna cut-off machines, and the peripheries of the tubes are ground to a diameter of 2.014 inches on a series of three Cincinnati centerless grinding machines. Two-spindle Lehmann lathes are employed to rough-bore the tubes. The tubes are then finish-bored to a depth of 2 1/2 inches and a diameter of 1.655 inches, chamfered, and faced to a length of 7.565 inches on New Britain six-spindle chucking machines. Such a part is seen at A in Fig. 1.

Complete forming of the Venturi ends on the motor bodies is done on the Bliss 700-ton press seen in the heading illustration. This press is equipped with a nine-station rotary indexing table having one unloading, two loading, and

# Motor Bodies Cold-Formed Single Press

six working stations. Before loading, the operator places each machined tube over a fixed vertical plug gage to insure that the finish-bored end of the tube faces downward. He then places the tube in a nest on the indexing table at one of the two loading stations, as seen in Fig. 2. The lower face of the tube rests on a hardened and ground plate, and slides over this plate when it is indexed to the first working station.

Nine of the motor body locating nests are secured to the top face of the notched indexplate. The plate is indexed by means of a doubleacting air cylinder having a stroke of 14 inches. The length of stroke and the reversal of the piston-rod in the cylinder are controlled by limit switches. Unless the switches are closed at both ends of the stroke, the press will not operate. A spring-loaded brake shoe limits the speed of rotation of the index-plate, and a spring-loaded pawl overrides the plate during indexing and snaps into successive notches to prevent counterrotation. Angle-irons seen projecting upward from between the locating nests in Fig. 2 prevent indexing if any of the bodies stick to the punches on their upward strokes, since the bodies would strike the uprights during indexing. If the indexing is not completed, limit switches prevent the press from operating.

Progressive shapes to which the motor body tube is formed at the six successive working stations are shown from B to G, inclusive, in Figs. 1 and 3. Considerable experimentation was necessary in determining the shape of the punches to be used in successive dies. It was finally determined that only square-end, blunt punches were necessary in the dies at the first three positions. Typical of these three dies is the one seen in Fig. 4—a sectional drawing of the first forming die.

Since this die performs the most severe cold working of the tube A, die B is provided with a carbide insert C. The tube is forced downward through nest D and into the die by the blunt punch E and faceplate F. Each die is equipped with a spring-loaded, positive knock-out rod, such as the one seen at G, to maintain a constant level of the work-pieces when they are being indexed to successive stations. The rods are connected to the press ram by tie-bars for lifting, and are forced down by springs when the ram descends. In this way, the upward travel of the knock-out rods is limited, raising the motor

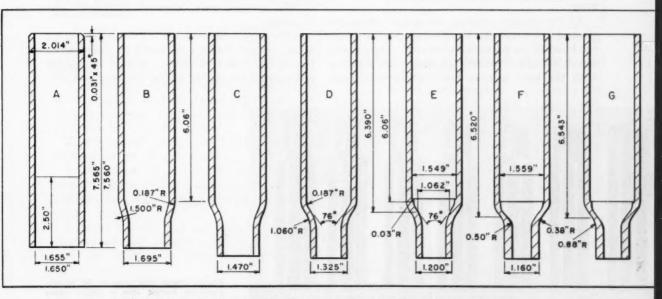


Fig. 1. Progressive shapes to which tube is drawn in forming a Venturi end on the motor body for a 3.5-inch bazooka rocket



Fig. 2. Close-up view of the nine-station rotary indexing table, having one unloading, two loading, and six working stations for forming motor bodies

bodies until they are flush with the upper surface of die B and the lower face of indexing plate H to permit indexing. Lubricating oil is pumped to each individual die, entering holes in the dies from nozzles J.

Dies employed at the fourth, fifth, and sixth working station are similar to the one described, with the exception that formed punches are used. Over-all length of the tube is stretched from about 7 9/16 inches to approximately 8 1/4 inches in drawing the Venturi end of the motor body.

At the seventh station, the motor bodies are pushed down through the die-shoe, and slide out the front of the press to a conveyor. After cleaning in an alkali washer, the bodies are stamped with the heat number from which they were made. This stamping insures proper heat-treatment, since the quenching temperature depends upon the analysis of the steel. Samples from each different heat of steel are checked for chemical analysis, and heat-treated to determine the physical properties developed.

After cold-forming of the Venturi, all bodies are annealed in a roller-hearth, controlled-atmosphere furnace. The bodies are then finish-machined, including centerless grinding of their peripheries; turning, taper-boring, and facing of the Venturi ends; internal threading; and knurling.

After again cleaning the motor bodies in an alkali washer, they are hardened by means of an isothermal heat-treatment. In this completely mechanized set-up, the bodies are held in a ver-

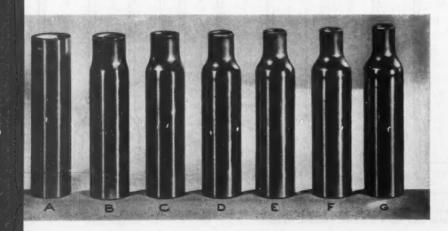


Fig. 3. Bored tube seen at (A) is progressively formed into a rocket motor body in six progressive operations on a single press.

Fig. 4. Sectional drawing of the first forming die.

A carbide insert (C) is employed to resist the wear
of this severe cold-working operation.

tical position on individual fixtures and immersed in a battery of salt-bath furnaces. The quenching medium is temperature-controlled and agitated to minimize distortion and prevent the formation of cracks. After drawing, the bodies are washed and rinsed to remove the salt, and then are subjected to a 100 per cent Rockwell hardness test.

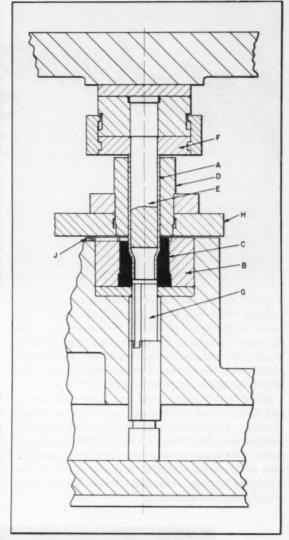
The bodies are then subjected to a hydrostatic test in which an internal pressure of 14,000 pounds per square inch is applied to the entire body, including the threaded area. An additional test of the body, except for the threaded area, is made at an internal pressure of 25,000 pounds per square inch. Bodies passing these tests are Bonderized and painted, and are then ready to be assembled in the 3.5-inch bazooka rockets.

#### Council for Technological Advancement Formed

Formation of the Council for Technological Advancement, "to program, pioneer, and promote ideas for a more dynamic American economy," has been announced by the Machinery and Allied Products Institute, with which the new Council is affiliated. The program of the Council will be under the guidance of a board of trustees of thirty-eight industrial executives of companies particularly identified with technological advancement.

The major fields in which the Council will be active are:

- Marketing of industrial equipment, both domestic and export.
- 2. Exchange and promotion of engineering ideas on plant modernization, alternative production methods, plant construction and location, and the like.
- 3. Equipment leasing and financing to expedite acquisition of new facilities.
- 4. Advancement of thinking on, and understanding of, measures which may be taken by industry to alleviate the cycles of demand for capital goods.
- 5. Inter-industry and university collaboration on economic and industrial research.
- 6. The relation of patents to technological advancement.
- 7. Economic measurement of the effects of the changing value of the dollar on industry's equipment depreciation and replacement policies.



8. More extensive education of industry on capital goods economics.

9. An information program for industry and the public on technological trends and new techniques, products, and industries.

The Council for Technological Advancement is headed by Alexander Konkle, who is the executive vice-chairman. He is also vice-president of MAPI. Headquarters of the Council will be in the Chicago office of the Machinery and Allied Products Institute.

A quality control system in operation in the twenty-one plants of the International Harvester Co. has improved quality, cut material requirements, and eliminated \$10,000,000 worth of labor and material losses in a four-year period.

# Materiali OF INDUSTRY The Properties and New Applications of

Materials Used in the Mechanical Industries

#### Air-Hardening Flat Stock for Wear-Resisting Punches and Dies

A new type of precision-ground flat stock made to a special analysis for hardening in air has been announced by the L. S. Starrett Co., Athol, Mass. This material, known as Starrett No. 497 Air-Hardening Flat Stock, is suited for making wear-resisting punches and dies. Because of its non-deforming characteristics, the die stock maintains its dimensions during heattreatment, and its air-hardening properties and wide hardening range (1700 to 1800 degrees F.) help to produce uniform results.

It is fully spheroidized for easy machining, and comes ready to lay out and cut in a range of sizes, each piece individually wrapped and marked for size, type, and heat-treating instructions. This material is recommended for punches and dies used in long-production runs or for stamping silicon, stainless steel, Monel, and other abrasive materials.

#### "Desegatized" Tool Steels Available in Larger Sizes

Six years ago the Latrobe Steel Co., Latrobe, Pa., introduced a series of high-speed steels that were free from carbide segregation, made possible by a secret process. Later, the concern added its group of high-carbon, high-chromium die steels to the "Desegatized" classification.

These steels are now available in much larger sizes than formerly. Recently, a bar of highspeed tool steel 10 inches in diameter by 10 feet in length was produced which is said to be entirely free of carbide segregation as determined by means of an ultrasonic reflectoscope, and by cutting discs from the ends of the bar and etching and polishing the discs. This large bar will be featured at the Metal Show to be held this month in Philadelphia. It is illustrated in Fig. 1.

The advantages of Desegatized tool steels are claimed to be fourfold: superior hot-forming properties; easier machining qualities; more



Bar of Desegatized high-speed tool steel 10 inches in diameter by 10 feet in length which is claimed to be entirely free from carbide segregation

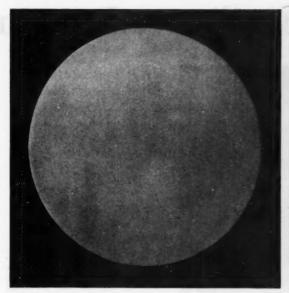


Fig. 2. Heat-treated, polished, and etched disc of Desegatized steel in which carbides are uniformly dispersed throughout

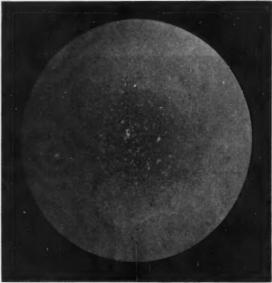


Fig. 3. Another disc of etched tool steel, not Desegatized, in which carbide segregations are apparent near the center

uniform response to heat-treatments; and extra toughness. Figs. 2 and 3 show tool steel samples that were hardened at the proper heating temperature, tempered, polished to a mirror finish, and etched in a 5 per cent nital solution for several minutes. The Desegatized specimen in Fig. 2 shows excellent dispersion of carbides throughout the entire cross-section, whereas the specimen in Fig. 3 shows considerable concentration of carbides near the center.

#### High-Strength Adhesive Bonds Metal to Metal

The latest in a series of thermosetting compounds, which is particularly suited for bonding together many hard-to-bond metals, including aluminum, has been announced by the Armstrong Products Co., Box 1, Warsaw, Ind. This compound, Armstrong Adhesive A-6, requires only contact pressure for joining, and cures at room temperatures. Curing may be accomplished in one to thirty-six hours depending on the temperature applied. It consists of a viscous paste and curing agent, and it does not shrink, swell, or creep.

#### Jet Black Finish on Iron and Steel Obtained by Immersion

"Parco Black," a jet black finish for iron and steel having good corrosion resistance, has been developed by the Parker Rust Proof Co., 2177 E. Milwaukee, Detroit 11, Mich. This product is used in water solutions at low temperatures. Parts to be treated are immersed from fifteen to thirty minutes in the processing bath, then are rinsed and dried. After oiling or waxing, the deep black durable finish is ready for service. Several advantages are claimed—the processing bath is non-caustic and is easy to prepare and control; operating temperatures are low; any part that can be immersed in the tank can be treated; and it is entirely suitable for machined or threaded parts.

#### Material Developed for High-Temperature Brazing

The development of a new material for the very high temperature brazing of molybdenum and tungsten electronic components has been announced by the American Electro Metal Corporation, 320 Yonkers Ave., Yonkers 2, N. Y. The material, a powder known as "Mo-braze," melts at a temperature of approximately 3450 degrees F. and is said to form a continuous, strong braze upon solidifying. The brazed joint is formed rapidly, and usually without any oxidation of the parts. In the furnace brazing of large parts, excellent brazed assemblies can be obtained in the range between 3450 and 3800 degrees F. Mo-braze can be used satisfactorily to braze molybdenum to molybdenum, tungsten to tungsten, and molybdenum to tungsten. It is available in 1-, 3-, and 6-ounce packages.

# **Hydroforming Facilitates Drawing**

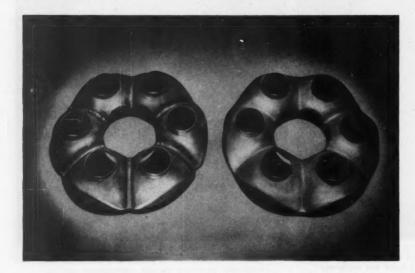


Fig. 1. Fuel nozzle swirl-cup for the combustion chamber liner of a turbo-jet engine formerly made by welding together six preformed sections, as seen at left, is now Hydroformed, as shown at right.

NE of the intricately shaped parts required for turbo-jet engines now being manufactured by the Pratt & Whitney Aircraft Division of United Aircraft Corporation, East Hartford, Conn., is the fuel nozzle swirl-cup. These swirl-cups are mounted on the entry end of the combustion chamber liners, and serve to stabilize combustion in the flame tubes. Because of the high temperatures and severe stresses produced by burning atomized fuel mixed with high-velocity compressed air, parts of the turbo-jet engine combustion chambers must be made from high-strength, heat-resistant materials. The fuel nozzle swirl-cups are made from a corrosion- and heat-resistant stainless steel, Aeronautical Material Specification 5521.

Swirl-cups were previously made by welding together six preformed sections, resulting in parts such as the one shown at the left in Fig. 1. A more satisfactory method was sought because forming of the individual sections was difficult, the finished parts were expensive, and rejects were high. Now, an improved product is obtained with much less effort and substantial savings in cost by means of the Hydroforming process. A swirl-cup produced in this way is shown at the right in Fig. 1.

The swirl-cup is only one of many jet-engine components for which Pratt & Whitney Aircraft is developing Hydroforming procedures, with the objective of reducing costs and improving quality. Hydroforming is a new method of forming simple or intricate shapes in all kinds of metals with fewer operations. In this method, performed on machines patented and manufac-

tured by the Cincinnati Milling Machine Co., the blank is formed to the shape of the punch by controlled hydraulic pressure transmitted through a flexible die member. More severe forming or deeper drawing is possible in a single operation because the forming pressure is varied but accurately controlled throughout the cycle. As an expensive matching die is not required, tooling costs are reduced more than 50 per cent. Also, since punch wear is reduced to a minimum, the punch can be made from less expensive material.

Fuel nozzle swirl-cups for the combustion chambers of turbo-jet engines are produced from 12 3/4-inch diameter blanks that have been stamped from 0.043-inch thick stainless-steel sheets on a Clearing 135-ton press. After cleaning in a vapor type degreasing machine, the blanks are formed first on an H-P-M 150-ton hydraulic press, producing parts such as the one shown at upper left in Fig. 2. In this operation, the round blank is drawn to a depth of 1.40 inches, and its thickness is reduced to not less than 0.039 inch.

After again degreasing, and then annealing, the rough shaped parts are formed on the Hydroform deep-drawing machine shown in Fig. 3. A close-up view of the punch is seen in Fig. 4. The punch, which is of the same shape required in the swirl-cup, is held in position by a stud that is anchored to the piston of a hydraulic cylinder located in the base of the machine. A drawring surrounding the punch rests on a universal sub-bolster clamped to the base of the machine. Diametral clearance between the punch and die ring can be 50 per cent or more of the thickness

# of an Intricate Jet-Engine Part

By Means of Controlled-Pressure Hydraulic Forming, Intricately Shaped Fuel Nozzle Swirl-Cups for Turbo-Jet Engines are Now Drawn from Round Blanks. Improved Quality, Fewer Operations, and Lower-Cost Tooling Have Resulted from This Improved Method.

By JOSEPH H. LAREAU
Advanced Tool Engineering Group
Pratt & Whitney Aircraft Division
United Aircraft Corporation, East Hartford, Conn.

of the metal being formed. The upper portion of the machine contains the hydraulic oil pressure cavity, the bottom opening of which is sealed from the work area by a flexible diaphragm. This diaphragm consists of two layers of rubber cemented together; the outer or lower layer serves as a wear sheet, and the inner layer confines the high-pressure oil to the cavity. Hydraulic pressure is transmitted through the diaphragm, which serves as a combination blankholder and universal die.

In operation, the partially drawn work-piece is placed on the top surface of the draw-ring. The flexible die member is lowered to press the under side of the outer edge of the part against the draw-ring, and is locked in this position. When pressure in the cavity reaches a predetermined amount, the punch is raised into the flexible die member. As the punch moves upward, the displacement created in the cavity will cause the hydraulic pressure to increase. By automatically controlling this pressure, uniform forces are exerted on the metal part from all directions, and the blank is hydraulically formed to the shape of the punch.

These multi-directional forces clamp the formed areas of the part against the punch—thus preventing further stretching—but cause the remainder of the metal to be drawn in around the punch. Then, the flexible die mem-

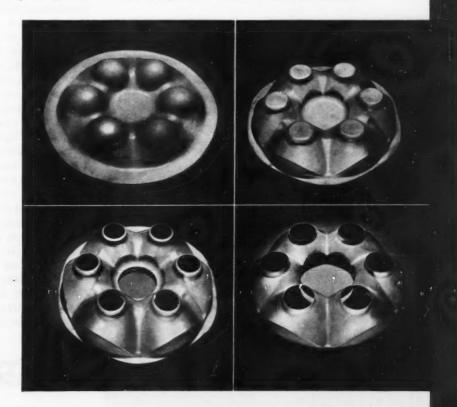


Fig. 2. Successive steps in making swirlcups consist of rough-forming a round blank, Hydroforming, restriking, and trimming operations.





Fig. 3. Over-all view of the Hydroform deep-drawing machine employed to produce swirt-cups. No matching die set is required in this operation.

ber is raised and the punch is lowered, and the completely drawn part is automatically stripped from the punch by the draw-ring. A Hydroformed swirl-cup is shown at upper right in Fig. 2, and being removed from the die in Fig. 5. Maximum depth of the cup is increased from 1.40 to 2.235 inches in this operation, but reduction in thickness of the metal is held to a minimum—a major advantage of the Hydroforming process.

Control levers are provided for raising and lowering both the punch and flexible die members. For safety, the machine is designed so that the upper ram is held up in the "open" position, during loading and unloading, by four locking cams which fit into grooves in each of the four supporting columns. The same cams fit into another set of grooves in the columns to lock the ram in its "down," or closed, position during forming.

Automatic control of the hydraulic pressure exerted during the forming cycle is obtained by means of a flat cam mechanically connected to the lower hydraulic ram. Adjustable set-screws protruding from the cam contact a pressure valve, thus raising or lowering the pressure depending on the setting of the screws—which is determined from tests conducted prior to starting production. A pressure of 8000 pounds per square inch is the maximum developed by the pump on this 12-inch (maximum blank diameter) capacity machine. However, pressures up to 15,000 pounds per square inch can be generated as the oil cavity is reduced in size. The maximum pressure exerted in forming the swirlcup is 8400 pounds per square inch. The dial gage at the operator's right (Fig. 3) indicates initial blank-holding pressures of from 0 to 400 pounds per square inch, while the gage at the left shows pressures of from 400 to 15,000 pounds per square inch for forming.

A drum cam, directly to the right of the flat cam, is provided with T-slots for holding adjustable, dog type stops. The height to which the punch rises is controlled by one stop, while a second "edging" stop results in sharpening the drawing radius. A third stop provides the automatic setting for stripping the swirl-cup from the punch after forming. The maximum punch stroke of this 12-inch Hydroforming machine is

Fig. 4. Close-up view of the Hydroforming machine, Fig. 3, showing details of the form punch which is raised into a flexible die member.

7 inches. The floor-to-floor time for Hydroforming each swirl-cup is two minutes, resulting in a production of thirty per hour. Materials of different thickness and composition can be formed equally well with the same punch and flexible die member.

Little maintenance is required with Hydroforming dies because the cushioning action of
the flexible die member reduces punch wear, and
since the tools are self-centering, alignment of
punch and die is not necessary. Also, because
of the small amount of wear, heat-treatment of
the punch is frequently not required. However,
the punch should be hardened for high-production runs. The swirl-cup punch is made from
six identical, wedge-shaped segments, the under
sides of the segments having dowels that fit into
a bottom plate.

In Hydroforming, thinning out or wrinkling of the metal is greatly reduced or eliminated. Also, there is practically no spring-back of the drawn parts. This is essentially due to the continuous wrap-around action of the flexible die member, and the accurately controlled, variable forming pressure, which is evenly distributed over the complete blank during the entire forming action. Consistently uniform parts are obtained, and, because of the flexible die member, the surface of the material being formed is not scuffed or marred.

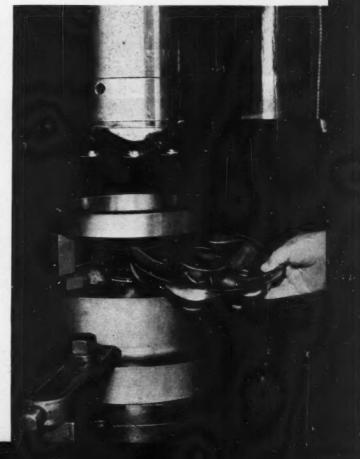
The swirl-cups are again degreased and annealed after Hydroforming. Then, six equally spaced holes, 1.437 inches in diameter, and a center hole, 2.500 inches in diameter, are pierced in the part in one stroke on a Bliss 58-ton mechanical press. A Lake Erie 150-ton hydraulic press, Fig. 6, is used to restrike the swirl-cups, in order to correct any deformation resulting from the preceding piercing and annealing operation. A pierced and restruck part is seen at lower left in Fig. 2. After trimming excess material from the periphery on a lathe, the finished cup appears as shown at lower right.

The current rate of machine tool production is close to \$100,000,000 monthly, or double that of a year ago; and the backlog of unfilled orders for the industry as a whole has been reduced from the peak in early 1951 to an average of fourteen months at current production rates. For many of the more critical tools, however, the backlog is much higher—from twenty to forty months at current production rates.

Fig. 6. Swirl-cups are restruck in this 150-ton hydraulic press to correct any deformation resulting from the piercing and annealing operations.

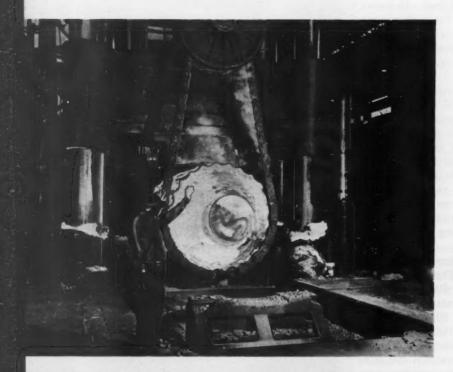


Fig. 5. Here, a completely drawn swirl-cup is being removed from the Hydroforming die. The cup is drawn to a depth of 2.235 inches.



## Forging Huge Compressor Discs for

Mammoth Axial-Flow Compressors will Create Wind Speeds Several Times that of Sound for the New Wind Tunnel at the Ames Aeronautical Laboratory of the National Advisory Committee for Aeronautics. These Views Show how Forging One of the Huge Discs for the Compressors was Skillfully Performed at the Bethlehem Steel Co., Bethlehem, Pa.



First operation consisted of working out mold corrugations until ingot was perfectly round. Chains from everhead hoists supported ends of ingot and retated it between strokes of press ram. Ingot was 92 inches long and weighed over 48 tons.

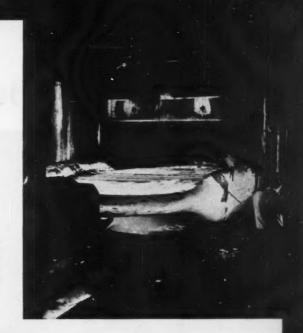


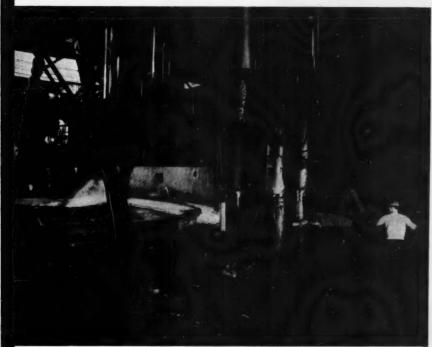
After ingot had been cropped and upset, it was placed on end, as illustrated, and a series of press strokes increased its diameter. The hoist chain supported heavy bar by which ingot was advanced through dies. Kneading action helped to refine grain of alloy steel ingot.

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### **New Wind Tunnel**

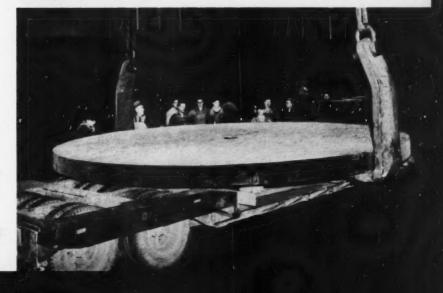
This forging operation reduced greater part of ingot to required thickness as it was advanced through dies. Because of limitation by distance between columns of press, lips had to be left on each side of ingot.





This final forging operation reduced lips to required thickness. Two forgings were handled simultaneously to prevent unequal loading of press. Between each forging operation ingot was returned to furnace for reheating.

The 18-foot diameter disc was roughmachined on a large planer, then loaded onto this low-bed trailer truck. Too large for roil shipment, the discs were transported to wharfside in Philadelphia for boat trip to Newport News, Va. Following completion of compressors at the Newport News Shipbuilding & Dry Dock Co., they will be shipped, through Panama Canal, to Ames Laboratory on West Coast.



## Douglas Detects Flaws



By W. C. HITT Assistant Chief Inspector Douglas Aircraft Co.

Fig. 1. Test part and scanner are both immersed in water. Oscilloscope will signal interruption if scanner moves over intervening flaw.

ON-DESTRUCTIVE ultrasonic testing of steel and aluminum aircraft components is now being conducted under water at the Santa Monica Division of the Douglas Aircraft Co., Santa Monica, Calif. The basic process, which is unchanged by the adoption of the new medium, involves sending out high-frequency waves in pulses by means of an oscillator. The waves are directed through a

quartz crystal scanner in contact with the surface of the part to be tested. When waves strike a boundary line in the object, such as is caused by a flaw or discontinuity, they bounce back into the scanner and are transformed to a visible signal on a cathode-ray tube.

In conventional non-destructive testing, conducted in free atmosphere, false signals will sometimes appear on the tube if the surface of

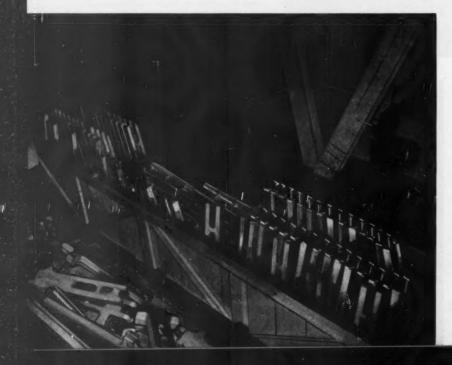


Fig. 2. Aluminum castings ready for testing in tank at ultrasonic laboratory at Douglas. Invisible flaws are rapidly detected in the castings by sound waves too high to hear.

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# by Underwater Testing

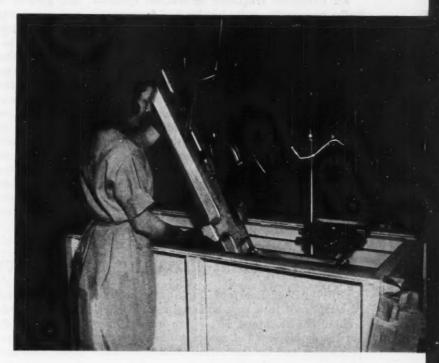
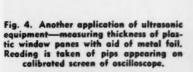


Fig. 3. Operator making use of a hoist to lower and raise a comparatively large part which is being tested for flaws in an ultrasonic tank

the part is rough. This is because the waves are diffracted as they pass through air gaps on the surface. As a result, the usual procedure is to prepare the test area by grinding, polishing, and coating with a lubricant, thus preventing violent reflections of rays passing through the air. In the new method established at Santa Monica, the test part and the crystal scanner are both immersed in water and require no preparation.

Beside saving much machine time, other advantages claimed for underwater testing are that a faster rate of inspection is possible, and that it is not necessary to follow the contour of the surface with the scanner. Also, areas which are inaccessible or impractical to cover by contact scanning can be readily tested under water. And because the scanner can be moved through various angles in respect to the surface of the test





part, a good approximation of the extent of any flaw or discontinuity present can be obtained with facility.

An ultrasonic frequency of 500,000 cycles—half a megacycle—is the low limit of frequencies used in underwater testing, and is reserved for material of coarse grain and poor homogeneity. Frequencies up to 15 megacycles are used intesting fine-grained, homogeneous materials, with 5 megacycles the commonest frequency for metals. Douglas may eventually go to frequencies as high as 25 megacycles, since such higher frequencies generally give sharper indications. Unfortunately, minor variations in the metal structure, not serious enough to be considered as defects, are also emphasized.

The use of the higher frequencies (10, 15, 20, and 25 megacycles) allows a greater working distance between the front and back echo. This

is very important in thicknesses of less than 1 inch. By incorporating the delayed sweep in the circuit, another improvement is found in that a still greater working distance is provided, as well as allowing a widely variable distance between the crystal face and material face. This eliminates the changing of scanner position in relation to the parts being inspected, a feature which is especially important when scanning tapered surfaces.

Ultrasonic equipment also provides a fast and dependable means of measurement when only one surface of the part is accessible. Plastics may be measured by the insertion of aluminum foil between the crystal and the part to be measured, the foil acting to complete the electric circuit. Resonance type ultrasonic equipment such as the Magnavox "Sonizon" is especially adaptable to this method of inspection.

## New Heat-Treating Laboratory in Rockford

I PSENLAB of Rockford, Inc., has now been established in a new building at 2125 Kishwaukee St., Rockford, Ill., which has facilities for the development of new metal heat-treating techniques, and for the testing of latest methods and equipment. Emphasis is placed on the application of various protective gas atmospheres for the treatment of ferrous and non-ferrous materials. Bright-hardening, carbo-nitriding, carburizing, annealing, tempering, and controlled-oxidation tempering processes are featured. An important function of the laboratory is to provide service to customers, including recommen-

dations for selecting the most suitable processes and equipment to meet individual problems.

The laboratory equipment includes Fisher induction carbon apparatus for rapid determination of carbon in steel, variable-speed polishing heads for the preparation of metallographic specimens, and a Tukon hardness tester. In addition to the controlled-atmosphere furnaces for the various heat-treating processes, there is suitable equipment for oil, water, and brine quenching. Atmosphere generators are available to produce endothermic, exothermic, and dissociated ammonia compositions.

View of atmosphere-controlled heat-treating equipment in the new building of lpsenlab of Rockford, Inc., which has been opened for research and customer service



# Metal Show to Emphasize Freedom's "Big Five"

OUNDING off with the theme "Metal Keeps the Peace," the Thirty-fourth National Metal Congress and Exposition will be held in Philadelphia, Pa., October 18 to 24, inclusive. Technical sessions and exhibits will aim to demonstrate how Freedom's "Big Five"—science, metallurgy, engineering, design, and production—are each contributing to the more effective use of metals, both in our civilian economy and in our defense against aggression.

As in previous years, four prominent societies are co-sponsoring the show: the American Society for Metals, the American Welding Society, the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing.

Exhibit space at Philadelphia's huge Convention Hall has been completely sold out to more than 400 nationally known firms engaged in the treatment or fabrication of metals and metal products, or in rendering various services to the metal industries. In addition, a large area will be devoted to the seventh Metallographic Exhibit of the American Society for Metals.

On both Saturday and Sunday morning and afternoon, October 18 and 19, the American Society for Metals will hold its annual seminar. This year's subject will be "Modern Research Techniques in Physical Metallurgy." Throughout the week of the show, this Society and the American Welding Society will hold morning, afternoon, and evening technical sessions. The Institute of Metals Division, A.I.M.E., will hold day and evening sessions Monday through Wednesday, and the Society for Non-Destructive Testing will hold sessions during four days of the week.

Titles of some of the A.S.M. papers which should be of interest to metal-working production men are: "Mechanism of the Carburization of Some Stainless Steels," "Influence of Grain Size on High-Temperature Properties of Monel," "Effect of Carbon Content on 18-4-1 High-Speed Steel," "Effect of Various Heat-Treating Cycles on Temper Brittleness," and "Hardness of Various Steels at Elevated Temperatures."

Among the A.W.S. papers will be the following: "Welding and Brazing of Titanium Alloys," "Corrosion of Structural Spot Welds," "Selection and Evaluation of Methods of Hard-Facing," "How to Save Costs by Designing for

OUNDING off with the theme "Metal Keeps Structural Welding," "Weld Cracking of Aluthe Peace," the Thirty-fourth National Metal Congress and Exposition will be In Philadelphia, Pa., October 18 to 24, inside. Technical sessions and exhibits will Ships."

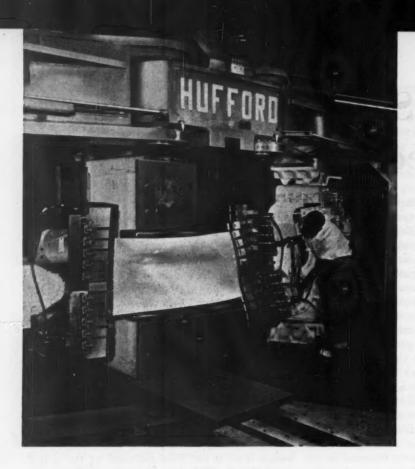
Included in the papers of the Society for Non-Destructive Testing are these: "The General Electric Industrial Betatron," "Some Industrial Applications of Micro-Radiography," "Economic Factors in Non-Destructive Testing," "An Evaluation of New Immersion Ultrasonic Testing Techniques," and "A Metal Comparator for the Inspection and Classification of Metals."

Presentation of two awards will be a feature of the annual dinner of the American Society for Metals on October 23, in the Benjamin Franklin Hotel. Dr. Robert F. Mehl, Department of Metallurgy, Carnegie Institute of Technology, Pittsburgh, Pa., is the 1952 recipient of the A.S.M. Gold Medal. This award is given each year in recognition of outstanding work in metallurgy. Dr. Mehl, one of the country's leading authorities on metallurgical education, has made noteworthy contributions in this field.

The 1952 A.S.M. Medal for the Advancement of Research will go to Cleo F. Craig, president of the American Telephone & Telegraph Co., New York City. This award is presented annually to an industrial executive who, by fostering research, has given material encouragement and assistance in advancing the arts and sciences related to metals. As a member of the Board of Directors of the Bell Telephone Laboratories for eight years and subsequently as president of the American Telephone & Telegraph Co., Mr. Craig has given active and untiring support to laboratory research.

#### Aluminum Output Exceeds Peak War Production

The United States aluminum industry produced 17 per cent more during the first half of 1952 than it did in the first six months of 1943, the peak production year of World War II. The June production of 154,952,241 pounds brought the six-month total to 923,072,606 pounds, an increase of 14 1/2 per cent over the same period last year, and almost 13 per cent more metal than was turned out in the entire year of 1946.



# Stretchto Meet

By THOMAS A. DICKINSON

STRETCH-FORMING, which contributed so greatly to accelerated aircraft production during World War II, is now being adapted at North American Aviation, Inc., Los Angeles, Calif., to many new applications. This has been made possible by the development of improved machinery and better processing techniques.

The basic stretch-forming process still consists of gripping a metal sheet, extrusion, or rolled section at each end in jaws and stretching or wrapping the sheet over a form block shaped to the contour required in the work-piece. However, as a result of the recent developments, it is now possible to (1) stretch sheet stock (and, less frequently, rolled sections, or extrusions) over form blocks that have compound contours; (2) form sheets or sections of unprecedented large dimensions; (3) minimize the amount of scrap material that must be trimmed from stretch-wrapped work; and (4) fabricate materials in the soft, annealed, or half-hard condition.

With available stretch presses, metal sheets as thick as 0.250 inch have been satisfactorily stretched in the North American plant, although sheets are generally 0.064 inch or less in thickness. Extrusions and rolled sections as long as 200 inches can be formed if their cross-sectional dimensions do not exceed the capacity of the machine jaws. The largest jaws in current use for work of this character have a maximum opening of 12 inches.

Sheet stock is being loaded into a Hufford stretch press of 150 tons rating in Fig. 1, while the heading illustration shows this machine engaged in pulling a sheet over a typical form block. In Fig. 2, a finished part is about to be removed from the machine, the operator having released the multiple jaws which grip the sheet securely at both ends.

In all of the operations illustrated, the machine is equipped with Kindelberger jaws, which were designed at North American Aviation, Inc. As originally developed, Kindelberger jaws could be mechanically adjusted so that the over-all contour of the segments would be approximately in line with the contour of the form block. This was satisfactory to the extent that relatively short metal sheets could be stretched without defects, but considerable time was required prior to each production run in setting up the jaws to suit the contour of the form block.

The jaws on the machine illustrated in Fig. 2 are linked together hydraulically in such a way that they automatically register with the contours of the form block after they are loaded, due to the force exerted on the individual jaw segments when the operation is performed. Setup time has been greatly reduced.

The advantage of these jaws over conventional jaws is that they enable sheets to be stretched with a minimum amount of excess stock, thus conserving material. For example,

# Forming Techniques Improved Present-Day Demands

a sheet-metal blank 140 inches long by 18 inches wide was required for making a certain part when the stretch press was equipped with the original jaws. Since the machine was fitted with Kindelberger jaws, the same part is being produced with a sheet only 114 inches long by 18 inches wide. Accordingly, each time the part is made there is a saving of 468 square inches of sheet metal.

Materials and form blocks are preheated in some circumstances to increase the flow properties of the stock; and when it is necessary to work the metal beyond its elastic limit, progressive forming operations are carried out and the metal annealed once or several times before it is stretched to its ultimate contour.

Form blocks with numerous compound curva-

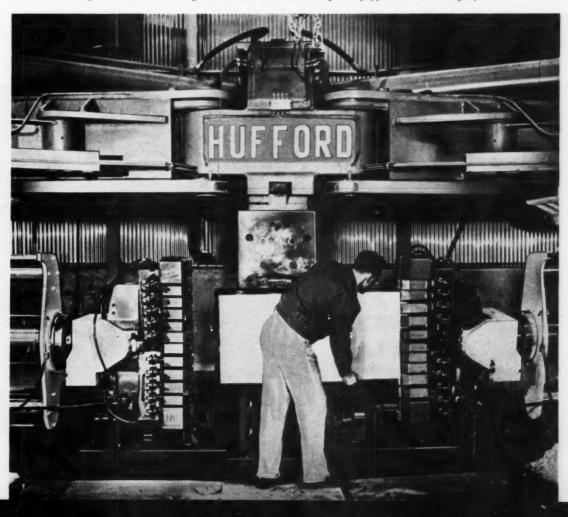
tures have been used in stretching sheet stock, but sections or extrusions normally necessitate blocks with single or extremely slight two-plane curvatures.

Stretch form blocks are normally made of cast materials, such as phenolformaldehyde plastics, lead, or Kirksite. Their design never includes allowances for spring-back because the stretch of the material is successive, beginning at the point of first contact with the form and proceeding away from that point toward the edges of the metal so that spring-back is not present with sheets.

Specific considerations that govern the design of parts to be stretched from sheet stock can be summarized as follows:

1. Each stretched part should have a trim line





1 inch wide on all sides, plus 3 to 8 inches of clearance between the edge of the form block and the edge of the stock in the direction of stretch. A greater amount of clearance should be specified where saddleback shapes are stretched in a longitudinal direction.

2. Reverse curves must be produced at right angles to the direction of stretch—never in line with the direction of stretch—when it is not desirable or practical to produce each curve as an individual part.

3. The most desirable shape for stretching is a convex contour, saddlebacks being difficult to form if they are not relatively flat or adaptable to longitudinal stretching.

4. In the transverse stretching of saddleback shapes, the edges of the sheet stock should initially contact the form block surfaces, and the width of the part should not exceed 42 inches so as to guard against undesirable wrinkles.

5. Sharp bends should be avoided as much as possible. For example, in stretching sheet stock into a V-trough, the radius at the bottom of the trough should be at least eight or ten times the

metal thickness, because despite the tendency of the metal to slide, friction and the strength of the material can prevent satisfactory forming to a minimum bend radius. When a radius of less than 1 inch is required, the usual practice is to stretch-form the part to a 1-inch radius and to produce the specified bend by means of a supplemental hydraulic press operation with a lead punch and mating die.

6. The tentative limit for longitudinal stretching is a minimum length of twice the width of the part, but this becomes a consideration only when parts must be stretched parallel to the grain of the metal in order to take advantage of the maximum permissible elongation of the material.

Varied stresses, local friction, and other unpredictable factors make it virtually impossible for a tool or parts designer to compute the elongation and the thinning that can be expected in stretch-forming sheet metal with any degree of accuracy. However, North American engineers have discovered that difficulties due to inaccurate computations can be minimized by means of

Fig. 2. Removing a stretched sheet-metal part from a press equipped with hydraulically controlled Kindelberger jaws which automatically adjust themselves relative to the contour of the form block

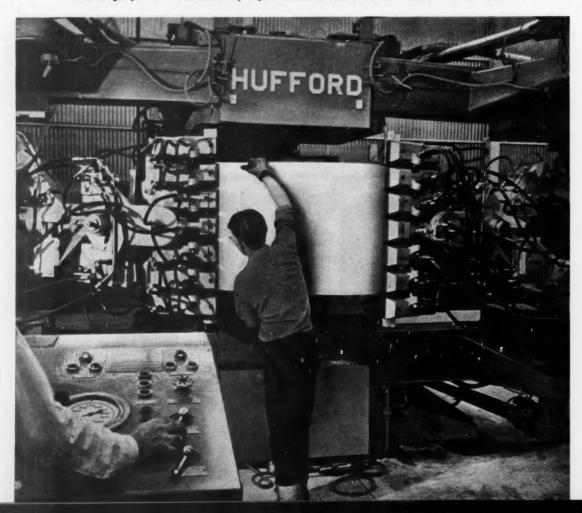
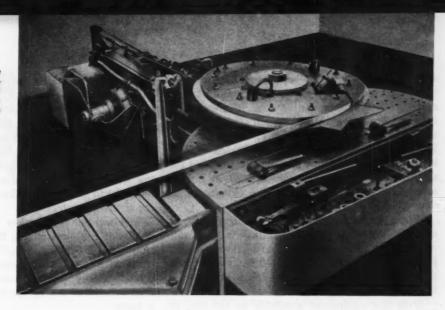


Fig. 3. Type of machine employed in the stretchforming of extruded and rolled sections. Parts can be formed around complete circles.



rough estimates based on empirical test data. For example, in work with aluminum alloys, it can be safely assumed that elongations will rarely exceed 14 per cent, while reductions in thickness will average about 5 per cent (never more than 7 per cent).

A physical effect of stretching, like any other forming method, consists of work-hardening the sheet material—thus increasing both yield and ultimate strengths, while decreasing the potential elongation. Typical values show increases up to 20 per cent for yield strength and up to 10 per cent for ultimate strength after a material has received its final heat-treatment.

Stretch-forming is an especially good technique for extrusions and rolled sections, as, for example, in converting one-half hard stainless steel extrusions into components of fuselage frames. With this practice, difficulties due to spring-back are reduced; sections once fabri-

Fig. 4. (Above) Diagram indicating the manner in which sheet-metal parts are stretched longitudinally. (Below) Sketch which shows the general technique of transverse stretching of sheet-metal stock adaptable to many applications

Fig. 5. (Above) Drawing which indicates how motal is transversely stretched into a saddleback shape. (Below) Diagram showing how shapes having reverse curves parallel to direction of stretch are parted at line of tangency and formed in two pieces



cated as two or more separate parts can be stretch-formed as integral units; almost any cross-sectional shape can be stretch-formed; extrusions are more uniform when stretched than when formed by other methods; angles between legs of a given section can be varied with a stretch form block, thus eliminating the need for considerable handwork; and tensile and yield strengths are increased, while elongation is decreased.

When joggles or sharp reverse curves are required, however, stretch-forming is desirable only if the extrusions or formed sections are soft enough to be partly fabricated by means of a mallet and fiber block while each part is under tension on a stretch-forming machine.

With the equipment available at the end of World War II, it was not practical to stretch-form extrusions and rolled section when an included angle of more than 180 degrees was required; but with equipment now installed in the North American plant some shapes can be stretch-formed into complete circles. Fig. 3 shows the kind of machine employed for work of this type. The form block is fastened to a drum on which a steel cable is wound. One end of the work-piece is clamped to the form block, and an initial stretch is performed. Pressure is maintained as the drum and form block revolve, and the part is wrapped around the form block through 360 degrees of rotation.

The most desirable shape for section contour forming is a hat-section, either extruded or formed, because of its stability after forming. When released from the machine, a hat-section will not twist as L- or Z-sections do because of unbalanced spring-back. Spring-back difficulties can be minimized by careful planning in working with most sections—for instance, by adding material to one leg of a Z-section so as to equalize stretching stresses.

The location of flanges with respect to the radius of contours affects the maximum elongation induced by stretching. For example, L-sections with heels on the inside of a turn can be stretched only about two-thirds as much as the same sections having heels on the outside of a turn.

Reverse curves can be formed on sections with radii of several inches when it is possible to pull the arms of the stretch press around a form block for each major curve. Form blocks can be added when it is necessary to change the direction of pressure.

As a rule, the main legs of an extrusion or section are positioned in the plane of curvature in order that they will be fully supported by the form block as they are stretched. When this is impractical, filler materials such as Cerrobend can be poured into hollow areas between legs or into an extruded tube to prevent wrinkles and other defects from developing during stretching.

#### Torit Diamond Dust Salvaging Units

Until recently there was no economical way to salvage industrial diamonds lost in the wearing away of diamond-impregnated grinding wheels and diamond-tipped tools used for truing and dressing grinding wheels. Today, however, bort and industrial diamonds can be reclaimed from these dusts, if they have not been mixed with wastes from ordinary grinding operations.

Where a diamond wheel is permanently installed as part of a grinding machine, segregation of these dusts presents no particular problem. A dust collector such as made by the Torit Mfg. Co., St. Paul, Minn., can be installed to serve only that machine. With this unit there is no danger of any of the dust being lost, for the filters are constructed of an extra hard surfaced and tightly woven material. No particles can become enmeshed, and a few strokes of the foot-pedal shakes them into the storage tray.

To collect diamond dusts from machines where diamond wheels are used only intermittently, mobile units mounted on casters were developed. They can be equipped with flexible suction tube assemblies. This combination permits the dust collectors to follow the diamond wheel around the shop, keeping diamond dusts separate from ordinary operations. Similarly, these mobile dust collectors can be used during wheel dressing operations to salvage dusts from diamond-tipped truing and dressing tools.

#### Lincoln Mechanical Design Contest for Papers on Arc-Welding

Cash awards totaling \$30,000 await 101 winning contestants in a mechanical design contest just announced by the James F. Lincoln Arc Welding Foundation. The competition, open to designers, engineers, and manufacturers of machinery, calls for the writing of a paper describing the design and construction of a machine or machine element whose cost has been lowered or appearance improved because of arc-welded steel fabrication. A brochure on the rules of the contest, which closes July 27, 1953, can be had from the Lincoln Foundation, Cleveland 17, Ohio.

# Mechanisms

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and Other Devices

# Increasing the Movement of an Oscillating Shaft

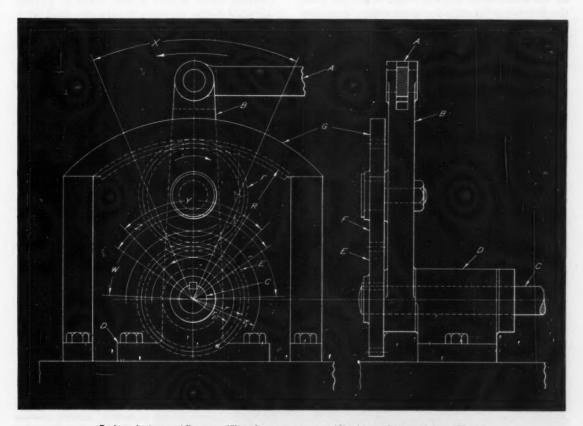
By L. KASPER

In fabricating a wire product, it became necessary to increase the angular movement of an oscillating shaft of a machine tool. Because of space limitations, it was impossible to increase the throw of the eccentric controlling the shaft, and some other means of obtaining the additional movement had to be devised, as shown in the accompanying illustration.

In the original design, the eccentric-operated rod A connected to an arm B was keyed to the

shaft C supported in a bearing D. In the present mechanism, the arm is free on the shaft and a gear E is keyed to the shaft. Another gear F rotates freely on a stud carried on the arm and meshes with gear E. Gear F also meshes with a segment of an internal gear G fixed to the bed of the machine. (In the right-hand view the supports for the segment have been omitted.)

The arm is shown at its central position moving in the direction indicated by the arrow. Gear F' is carried along with the arm, and since this gear meshes with the segment, it is caused to rotate on its stud. The rotation of gear F is transmitted to gear E and thus to the shaft. In the illustrated application, gears F and E are of



By introducing an idler gear (F) and a gear segment (G), the oscillation of arm (B) and shaft (C) can be increased without changing the throw of an eccentric-operated rod (A).

the same pitch diameter, gear F being an idler which has the effect of imparting movement to the shaft in the same direction as that of the arm.

Angle X indicates the magnitude of the oscillation of the arm. Actually, the gear F serves as a lever, with its fulcrum at the pitch line of the segment. In this manner the action of gear F causes an increase in the rotative movement of gear E as compared with the movement of the arm. Since in this particular design the gears F and E are of the same pitch diameter, the movement of the shaft is equal to angle Z.

However, with the pitch radius R of the segment unchanged but with the pitch radius r of gear E varied, other angular movements of the shaft can be obtained with the same angle X of the arm. For example, by increasing the pitch radius of gear E to  $r_1$ , the movement of the shaft will be decreased to angle Y; or by decreasing the pitch radius of gear E to  $r_2$ , the movement of the shaft will be increased to angle W. The pitch diameter of gear F must, of course, be decreased or increased at the same time, but because this gear is an idler, its diameter does not enter into any calculations.

In order to determine the angle of oscillation of the shaft with a given angle X of the arm, the following formula for a planetary gear system will apply:

$$Q = X + \frac{XR}{r}$$

where

Q = angle of oscillation of shaft;

X = angle of oscillation of arm;

R =pitch radius of segment; and

r =pitch radius of gear E.

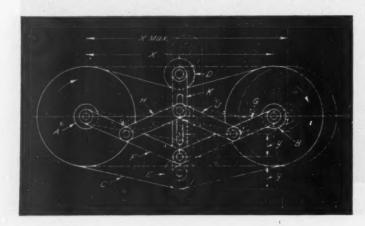
With this mechanism it is possible to increase the movement of the shaft an unlimited amount, depending on dimensional requirements and space limitations, but a decrease in the angular movement of the shaft relative to the movement of the arm cannot be obtained. Incidentally, there is an interesting and useful feature of this mechanism in that it is possible to oscillate the shaft in excess of 180 degrees without encountering a dead-center condition which would be a limiting factor, were the arm directly connected to the shaft.

#### Transmitting Uniform Speed Between Shafts Having Variable Centers

By P. GRODZINSKI

Driven shafts can be rotated at uniform speeds regardless of variations in the distance from their driving shafts by means of the simple pantograph linkage mechanism seen in the illustration. The mechanism maintains uniform tension on a drive belt between shafts having a variable center distance. While a number of plane link mechanisms utilizing as many as eighteen joints and twelve members have been devised for this purpose, the device here described requires only six joints.

Driving shaft A and driven shaft B, having a variable center distance X, are provided with flat-belt pulleys connected by a steel band C. To provide a uniform tension on this band-independent of any changes in the center distance the drive is equipped with two idler pulleys, D and E, which are guided by a pantograph linkage consisting of levers F, G, H, and J. The long levers F and G are free to pivot about pins pressed into the ends of shafts A and B. Slotted bar K, carrying pulleys E and D, is guided in a direction perpendicular to the common center line of the shafts when the center distance is varied. The relative positions of the mechanism components when shaft B is at its maximum distance from shaft A are shown by broken lines.



Idler pulleys (D) and (E), guided by a pantograph linkage mechanism, maintain uniform tension on steel band (C) when the center distance between shafts (A) and (B) is varied.

## TOOL ENGINEERING

Tools and Fixtures of

Tools and Fixtures of Unusual Design and Time- and Labor-Saving Methods that Have been Found Useful by Men Engaged in Tool Design and Shop Work

#### Fixtures for High-Production Operations on Multiple-Spindle Drill Press

By ANDREW E. RYLANDER, Walnut Creek, Calif.

Where a work-piece has to be advanced from one drill press spindle to another, production can be materially speeded by designing a work-holding fixture which automatically advances and registers the work-piece under each spindle. The fixture shown in Fig. 1 has features which make it ideal for rapid drilling and tapping or related operations on a two-spindle drill press. Its main parts are: a dovetailed baseplate A, a slide B carrying a bushing plate C, a fixed locator D, a movable locator E controlled by a thimble F, a trigger G and a latch H, and a pair of ejector pins I. The slide is shuttled between the spindle stations by means of a rod J connected to an air motor.

The two stations of the machine perform a drilling and tapping operation consecutively. Since the diameter of the tap drill is of necessity less than the diameter of the tap, the drilling station is equipped with a receding yoke K, the purpose of which is to support a liner L. When the drilling spindle is lowered, the liner

engages the bushing plate, supporting the drill centrally as it operates.

To load the fixture, the movable locator is retracted manually by the thimble against the pressure of a spring M. The work-piece is then positioned over the fixed locator and is gripped by the movable locator which springs forward when the thimble is released. After drilling, the slide is shuttled to the tapping station. When the tapping is completed, the slide is again shuttled to the drilling station.

During the movement of the slide from the tapping station to the drilling station, the workpiece is automatically ejected and rolls down an incline N. This action occurs when the trigger passes over the end of the latch and thus causes the movable locator to retract. At that instant the ejector pins, whose springs O are together weaker than the spring of the movable locator, enter holes in the fixed locator and push out the work-piece. By the time the slide has completed its movement, the trigger has cleared the latch and released the movable jaw.

Actuation of the drilling and tapping spindles can also be performed pneumatically, and for an even greater degree of automation all the air motors can be synchronized.

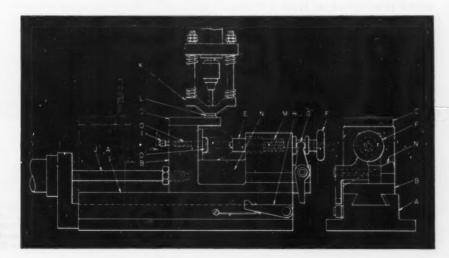
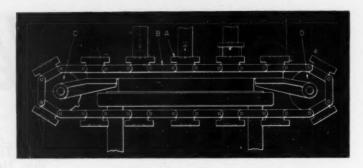


Fig. 1. Shuttle type fixture which permits a drilling and a tapping operation to be performed consecutively

Fig. 2. A fixture employing a conveyor principle which permits drilling, counterboring, and tapping operations to be performed at the same time



In Fig. 2 is shown a series of identical jigs A being conveyed on an endless chain B beneath three spindles of a drill press, simultaneously drilling, counterboring, and tapping three different work-pieces. Work is indexed automatically from spindle to spindle by the intermittent movement of the chain around the driving sprocket C and the idler sprocket D. In each cycle, work is loaded manually on a jig as it leaves the idler sprocket, advanced beneath the spindles, and then dropped on a chute as the jig travels over the driving sprocket. A completed work-piece is produced for each stroke of the machine. The jigs are accurately spaced along the chain to suit the spindle center distances which, of course, are the same.

The driving sprocket is actuated from a mechanism shown diagrammatically in Fig. 3. A continuously rotating "brain," or disc, A is driven by a motor B and carries a pair of cams C. A variable-speed belt connecting the brain and the motor permits the cams to actuate a micro-switch D and a four-way hydraulic valve E in time with the slowest spindle that is operating. When the lead cam trips the micro-switch, a solenoid F is energized and pulls a tooth lock G, against the pressure of spring H, out of contact with an index-wheel I. The second cam (which is set "late") then actuates the valve to direct pressurized oil from a hydraulic cylinder

J to raise a piston K linked to an arm L carrying a pawl M.

On the up stroke of the piston, the pawl engages one of the notches spaced around the periphery of the wheel, causing the wheel to rotate through part of a circle. When the second cam completes its travel beneath the valve, the valve drops down to reverse the flow of oil. The piston then executes a down stroke, returning the pawl around the index-wheel. The index-wheel is feathered to the shaft of the driving sprocket (C in Fig. 2), and the movement of the wheel is designed to produce the correct amount of lineal movement of the chain beneath the spindles of the drill press.

#### Simple Designs of Stripperless Dies for Punching and Blanking

By FEDERICO STRASSER, Santiago, Chile

For many punch press operations it is necessary to free either the completed part or the blank skeleton from the punch by means of a stripper. Under certain circumstances, strippers can be dispensed with entirely, whereas under other circumstances strippers can be replaced by scrap cutters.

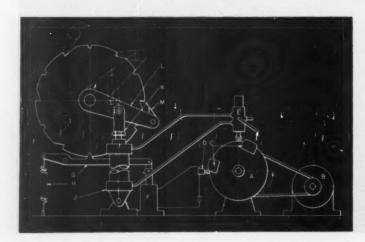
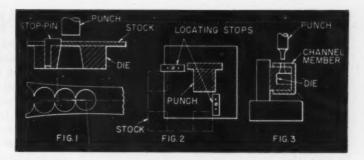


Fig. 3. This mechanism controls the intermittent movement of the chain of the conveyor illustrated in Fig. 2

Fig. 1. Because each blank produced slightly overlaps the hole left by the previous blank, the stock tends to spread apart. Fig. 2. Since the corners cut do not form a close contour around the punch, the blank skeleton will not adhere to the punch. Fig. 3. The position of this channel member around the die prevents the member from rising on the up stroke of the press.



Representative operations which do not need strippers are shown in Figs. 1, 2, and 3. If, as in Fig. 1, a blanking operation is such that there is no metal left between adjacent openings in the stock, the stock will spread apart as each blank is produced and will not adhere to the punch. The spread of the stock permits it to pass by the stop-pin, the head of which is made sufficiently narrow for this purpose.

Another example of an outline being cut by a stripperless blanking die is shown in Fig. 2. Here square corners are being cut out from large sheets, and because the outline produced was not previously entirely enclosed in the blank stock, the stripper can be eliminated. Also, in punching holes through the side of a channel member, as in Fig. 3, no stripper is required because the material cannot possibly adhere to the punch. Shearing dies and cropping dies likewise need no strippers.

Die design for blanking closed contours can be greatly simplified by substituting two scrap cutters for the stripper, as shown in Fig. 4. These cutters are chisel-shaped, and split the immediate area around the blank skeleton into

two parts which, of course, do not stick to the punch. The cutters are fastened with screws to opposite sides of the punch. To remove the strain from the screws, recesses for the cutters can be milled into the punch. The stroke of the press must be accurately limited so that the blank skeleton can be severed by the cutters as the punch passes through the stock without having the cutters strike the top of the die. However, if the stock is thick enough, usually a short penetration of the cutters is sufficient to divide the blank skeleton in two.

Wherever possible, the scrap cutters should be positioned at opposite points around the punch where the blank skeleton is narrowest, as in Fig. 5. In this manner, the work required of the cutters is kept at a minimum. The cutting action of the scrap cutters tends to spread the stock somewhat, and so to avoid any buckling of the stock when the spread is in the direction of the stop-pin, a special stop-pin incorporating a spring can be devised, as shown in Fig. 6. The spring compensates for the elongation of the stock, but is sufficiently powerful to return the head of the pin to its intended position.

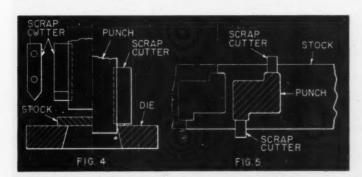
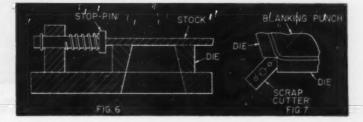


Fig. 4. View shows punch and scrap cutters at start of stroke (left side), and near completion of stroke (right side). Note axial location of scrap cutter. Fig. 5. Plan view of punch and scrap cutter. Small cutters can be used if they can operate at narrow points of the blank skeleton.

Fig. 6. Spring-loaded stop-pins permit the stock to be spread by the punch so that buckling is avoided. Fig. 7. Die sections in an inverted set-up cut along the edges of the scrap cutters as well as around the punch.



In Fig. 7 is seen another application of scrap cutters, as employed in an inverted blanking operation. Here the die is split into sections, and the scrap cutters fill the space between the sections and have a point contact with the punch. Each die section has a double cutting edge so that as the die descends, shearing takes place along the edges of the scrap cutters as well as around the punch.

#### Lathe Tailstock Adapter for Solid Taps and Hand Reamers

By W. M. HALLIDAY, Birkdale, Southport, England

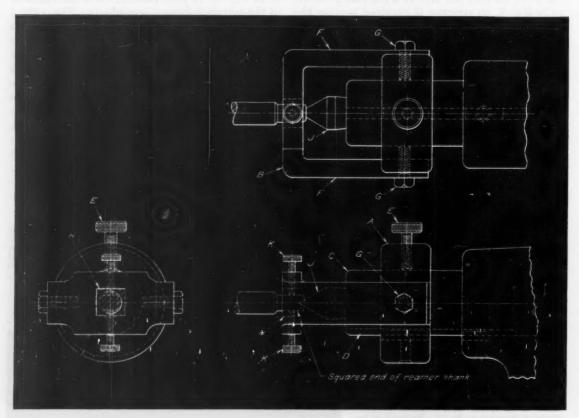
Tapping and reaming operations are frequently performed in a lathe. Where a solid tap or hand reamer is used, it can be aligned and supported on the spindle center line by the bearing of the tailstock dead center in the conical opening in the shank end of the cutter. Ordinarily an open-end wrench is held on the squared end of the shank to prevent rotation of the cutter. This practice is satisfactory, although somewhat awkward, in that it requires the use of both hands of the operator—one to maintain the

wrench in position and the other to advance the tailstock. Then too, a hard spot in the work hole might bind the cutter, jamming the operator's fingers between the wrench and the lathe bed.

Both of these undesirable circumstances can be avoided by means of the illustrated simple adapter for the tailstock. It consists of a collar A and a U-shaped yoke B. The collar fits the tailstock spindle C, being feathered to the keyway D and fixed against longitudinal movement by a thumb-screw E. The legs F of the yoke fit slots in opposite sides of the collar, and in which they are secured by screws G. A squared hole H in the central section of the yoke receives the squared end of the cutter shank.

The hole H is made large enough to accommodate a range of tap sizes. The tap is aligned and supported by the dead center J in the customary manner. Set-screws K are adjusted radially to contact opposite sides of the shank square, thereby preventing rotation of the taps.

The landing gear alone on a modern navy carrier plane weighs more than an entire navy fighter plane produced in the 1930's.



This adapter dispenses with the awkward, often dangerous, practice of using a wrench to prevent a solid tap or hand reamer from rotating

## New Process Flame-Plates with Tungsten Carbide

WHAT promises to be a metallurgical milestone is a new process wherein metal parts are flame-plated with tungsten carbide. The process—developed by The Linde Air Products Co., a Division of Union Carbide and Carbon Corporation, New York City—involves a deposit of tungsten carbide in thicknesses ranging from 0.0005 to 0.20 inch. Details of the flame-plating technique have not as yet been disclosed, but some of the merits and possibilities offered by the process can be cited at this time.

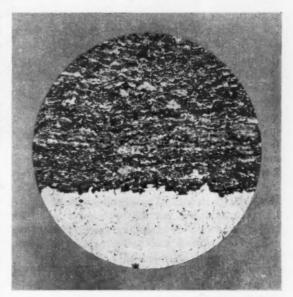
In the majority of applications attempted to date, parts flame-plated with tungsten carbide have shown wear resistance equal or superior to parts made entirely of sintered tungsten carbide, and vastly superior to cast alloys, chromium-plated parts, and tool steels. Parts flame-plated with tungsten carbide have all of the desirable properties of sintered tungsten-carbide parts—such as resistance to abrasion and frictional wear—and have a lower modulus of elasticity and a greater resistance to impact and thermal shock

One of the biggest advantages of this process is that the temperature of the base metal does not exceed 400 degrees F. during the plating operation. The low-temperature deposition practically eliminates any possibility of a change in the properties of the metal being plated, and also minimizes the possibility of warpage.

The process is exceedingly adaptable. Flat areas, cylinders, holes, and irregular contours can be coated. Present available equipment can handle surfaces up to 6 inches in width and 40 inches in length. Plated parts can be used as coated, or ground to a mirror finish. Steels of all types, cast iron, aluminum, copper, brass, titanium, and magnesium have all been coated successfully.

The accompanying illustration is a photomicrograph of a flame-plated coating at 300 magnifications. The tungsten carbide is the dark area; that of the steel base is relatively white. Between the two areas can be seen the jagged bond line which represents the slightly rough surface of the base prior to flame-plating, and which affords an ideal mechanical union. It can be seen that there is no mixing or dilution of the coating with the base.

Results of tests conducted on flame-plated parts thus far have been encouraging. Core rods used in powdered metal processing, usually made of sintered tungsten carbide, break frequently because of the inherent brittleness of this material. When steel rods which were flame-plated



Photomicrograph of a carbide flame-plated surface. The particles that form the coating are elongated and flattened into thin discs. The diameter of each particle is many times larger than its thickness.

with tungsten carbide were substituted, a considerably greater life span was realized, because the steel core absorbed the shock while the coating withstood the wear. Comparative wear tests of plug gages made of various metals showed that a flame-plated gage outwore a gage of boron carbide 5 to 1, and another of sintered carbide 3 to 1.

A chromium-plated burnishing broach having an average life of 8000 parts was replaced by a flame-plated broach. The latter was still in perfect condition after 80,000 parts, when it was accidentally broken because of misalignment of a part being burnished. A flame-plated drawing die was used successfully in a press operation involving 23,000 steel cylinders. The average life of steel dies previously used was from 5000 to 8000 drawings.

Other tests are being conducted on flameplated shafts, bearings, spindles, thread gages, saws, knives, ball bearings, lathe centers, and pump plungers. Thus far, these tests have met with comparable success.

A single aircraft manufacturer today uses more floor space than the entire aircraft industry did when World War II broke out in Europe.

#### Indexing Type Carbide Inserts Afford Maximum Tool Life

Maximum tool life and minimum down time are achieved while simultaneously chamfering both inside and outside diameters and facing the ends of 3 1/2-inch diameter steel cylinders of Shelby seamless tubing by the use of standard "Kendex" square cemented tungsten-carbide inserts. These inserts are used in the tool equipment of a Motch & Merryweather transfer machine. The machine utilizes two special facing heads, each one containing three 1/2-inch carbide inserts produced by Kennametal Inc., Latrobe, Pa. Two inserts are used for chamfering and the third for facing the work-piece to the desired length. The seamless stock is fed into the machine, cut off by a saw, and then transferred to four clamping jaws. Next, each end is chamfered and faced to length simultaneously, and then ejected.

The square inserts can be indexed four times to bring new cutting edges into the machining position. Width of cut on each of the inserts is less than 1/4 inch. Chamfer insert-holders are, therefore, positioned so that the actual cutting is performed near the end of each cutting edge. After indexing each insert four times, outside and inside diameter inserts are interchanged to provide an additional four indexes per insert. The facing insert-holder is simply moved in its slot to obtain two different cutting positions on each of the four cutting edges, or a total of eight positions.

Utilization of inserts in this manner enables 150 to 160 pieces to be machined per index, or 1200 to 1280 pieces for all eight positions. The



Two chamfering tools and one facing tool utilizing 1/2-inch square "Kendex" inserts of Kennametal Grade K3H in special facing heads

feed is 0.005 inch per revolution at a speed of 400 R.P.M., or the equivalent of 363 surface feet per minute.

After machining 1200 pieces, the insert tips are reground on the top only, and the indexing sequence is repeated. Two such regrinds give a total of 3600 to 3840 pieces per set of six inserts. The time required for changing the six inserts is less than ten minutes. A ten-to-one soluble oil is used as a coolant during sawing, but the tips are used without any coolant.

#### Air Force's Heavy Press Program for Large Aircraft Parts

A contract for the construction of new aluminum-forging facilities at Newark, Ohio, for the U. S. Air Force's heavy press program has been awarded by Kaiser Aluminum & Chemical Corporation. Construction is scheduled to be completed in approximately fifteen months. The Newark plant, on the site of Kaiser Aluminum's rod, bar, wire, and cable works, is part of the Air Force's \$389,000,000 program to mass-produce large aircraft parts with mammoth forging and extrusion presses.

Letters of contract have been signed with the Air Force to participate in the program by operating two of these gigantic forging presses at Newark and two extrusion presses at Halethorpe, Md. The over-all government expenditure for the plants, presses, and other equipment will be approximately \$55,000,000.

The forging presses—one having an over-all height of nine stories and rated at 35,000 tons and another of 25,000 tons hydraulic pressure—are being built by the E. W. Bliss Co. of Canton, Ohio. The country's largest existing forging press is 18,000 tons. The new presses will be able to fabricate, in a single piece, a major structural member of an airframe, affording considerable savings in time, skilled manpower, and material over the conventional method of machining smaller structural parts and joining them together.

For example, a wing panel weighing 110 pounds can be forged from a 120-pound aluminum billet, compared with a 480-pound billet required for the same panel produced by present methods. A conventionally fabricated stabilizer, consisting of 547 pieces, exclusive of attached hardware, will be replaced by a stabilizer made of only five forgings. One of the greatest values of this method of fabrication is superior strength, which permits greater speed and maneuverability of the aircraft.



By BERNARD LESTER
Lester and Silver
Sales Management Engineers
New York and Philadelphia



### Selling Ideas versus Tools

AMERICAN business points its finger to the machine tool industry as one marked by extreme ups and downs. These wide variations have been a nightmare for decades, and how to avoid them is a major problem.

When you point to soap chips, coffee, toothpaste, and hundreds of like commodities, you find a fairly even total demand. They are used up.

Should any supplier for a particular brand suffer a setback, he immediately stimulates sales by a specialized personal promotional effort. But such effort upon a particular type of machine tool produces only minor results in increasing total demand, even though a design improvement may be made.

This pronounced difference between machine tools and commodities is due to the fact that in selling machine tools we must sell not only the product—the machine tool itself—but the idea that the use of modern machine tools and other shop equipment is at the root of progress in the metal-working industry. Selling this idea in addition to a type of tool offers the greatest opportunity for correcting wide fluctuations in the demand for tools.

Years ago when one electrical manufacturer developed and tried to sell the tiny no-fuse circuit breaker, he at once met combined sales resistance from all fuse suppliers. Only when other manufacturers were licensed to build the device, and together they started selling the idea in addition to the product, was headway made.

Tell Berna, general manager of the National Machine Tool Builders' Association, has stated this situation very clearly:

"One thing we know—the future of our industry depends directly upon our ability to persuade metal-working shops in the United States and Europe to replace machines when it can be done at a profit. The whole problem of the industry boils down to that."

The machine tool industry has done much to promote the idea of replacement of machines, aimed at the metal-working industry. But the major job is that of the thousands of sales engineers who are in daily contact with customers. We must sell the idea in addition to the tool. Too many of us disregard the vast opportunity to sell the idea—the idea of modernization—to those who make no inquiry for a tool.

First of all, it requires a lot of knowledge in business and industry.

Second, it requires contacting men at a wider range on different levels of responsibility.

Third, it necessitates repeated calls for customer decision.

All these requisites point to the fact that the machinery salesman must not only combine engineering skill and sales prowess, but beyond these, ability as a broad-gage businessman. Too few of us possess enough of the last quality. Too many of us are clever only technically, and persuasive in handling the immediate job.

In a lumbering area, the energetic owner of a saw mill, whom I know, has been particularly successful. He has a good mill and does fine work. But he outstrips others because he constantly studies the whole area around—knows every stand of growing spruce—hard and soft pine—every wood lot. He gets an option on the cutting well in advance, and thus develops his supply. He not only plans his lumber supply, but follows up every young married couple ready to build a home, or city slicker in search of a campsite. He's always trading in ideas—hence he sells lumber.

Some equipment salesmen too nearly resemble a cutting tool that has a first class tip but a poor support. They can focus on the individual problem, but have a long way to go in doing a better promotional job. Sales engineers can go far to prevent business fluctuations.

# LATEST DEVELOPMENTS IN



# Ipsen Furnace Developed to Combine Bright Tempering and Controlled Oxidation

Both bright scale-free tempering and controlled-oxidation tempering within the range of 400 to 1400 degrees F. are possible in a tempering unit introduced by Ipsen Industries, Inc., 715 S. Main St., Rockford, Ill. This sealed, controlled atmosphere tempering furnace is designated the Ipsen D-300. It utilizes a completely new method of controlling oxidation developed recently by the Ipsen engineering staff.

In past years, bright or controlled-oxidation tempering was not important because a heavier scale, already formed on the piece at higher temperatures during the heat-treating cycle, made a cleaning or pickling operation

necessary. The development of bright, scale-free heat-treating, however, offered the opportunity to save considerable time and expense by bright or controlledoxidation tempering which eliminates the cleaning operations previously required.

For bright tempering, the D-300 tempering unit is supplied during the entire cycle with a protective atmosphere. After sufficient time at the required temperature, the load is cooled in the furnace until it reaches approximately 400 degrees F. The bright scale-free work is then cool enough to be removed from the furnace without danger of oxidation. The finish remains clean, bright, and

scale-free, and no cleaning or pickling operations are necessary before subsequent plating or painting.

Controlled-oxidation tempering of ferrous metals in the new furnace also provides protective coatings of an attractive blue-gray or blue-black appearance. Such coatings are often desired to reduce corrosion or wear, and are produced either in a separate operation or concurrently with a tempering or annealing operation.

The protective atmosphere is used to maintain a bright surface during any necessary tempering or annealing operations prior to the controlled-oxidation cycle. It is therefore possible to maintain strict control over the oxidation process irrespective of the tempering or annealing portions of the cycle. After the load is heated or cooled to the oxidation temperature, the flow of protective gas is discontinued and a predetermined quantity of water is introduced into the unit for a specified period. The work is then removed from the furnace and air-cooled or liquid-quenched.

During either air- or quench-cooling, further oxidation is prevented by the controlled oxide coating. The air-cooling produces a blue-gray coating, and the oil quench forms a darker blue-black finish, due to the penetration of oil into the oxide film. This darker coating is considerably more resistant to corrosion. Either soluble oil or standard quenching oil may be used.

The close temperature control possible with the D-300 furnace aids tempering of non-ferrous



Fig. 1. Furnace which performs both bright tempering and controlledoxidation tempering operations, announced by Ipsen Industries, Inc.

# Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on Market

Edited by FREEMAN C. DUSTON

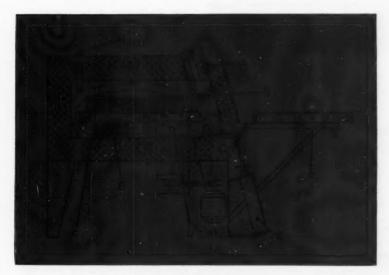


Fig. 2. Diagram showing general design of bright tempering and controlled-oxidation furnace illustrated in Fig. 1

metals. Many of these metals are very sensitive to temperature differences, and often the tempering must be carried out close to the melting point of some of the softer metals and their alloys. Solution heat-treatment of aluminum, annealing of copper and brass, and precipitation or solution heat-treatment of beryllium copper are a few of the many applications for which this dual-purpose furnace is adapted.

The Ipsen D-300 automatic, sealed unit shown diagrammatically in Fig. 2 is designed for use with a controlled atmosphere, but it can also be used as a conventional tempering unit. The welded gas-tight frame, and the flat, ground door frame and door plate A practically eliminate leakage problems. The door construction and its air-hydraulic lifting mechanism E are the same as used on

other Ipsen automatic heat-treating units. The illustration shows the recirculation or forced-convection system of atmosphere circulation employed in the new unit. The fan circulates the controlled atmosphere continuously through the electrical heating element B and then through the load in the work basket C, which is designed to eliminate handling and extra work containers. This element is rated for extremely rapid recovery when a cold load is charged, and is designed for easy maintenance.

The water-jacketed bearing and short-coupled alloy metal fan at D assure long life for the circulating unit. The swivel roller loading platform at F provides for easy transfer of work baskets from other units. The controlled-atmosphere inlet is at G, and the special-atmosphere inlet at H.

#### Lincoln Alternating-Current Welding Machines

Several new developments in equipment and welding techniques will be shown by the Lincoln Electric Co., Cleveland 17, Ohio, at the Metal Show in Philadelphia. This company's exhibit will feature industrial models of alternatingcurrent welding machines in 300-, 400-, and 500-ampere capacities. These units complete the Lincoln line of 60-, 180-, and 200-ampere machines. The design replaces the previous 300- and 500-ampere machines and incorporates new features as well as mechanical changes.

The more compact design has the same high output and overload capacity as previous models, and incorporates the company's patented "arc booster" circuit.



Welding machine to be exhibited at the Metal Show by the Lincoln Electric Co.

The amperage dial mounted on the front of the machine is illuminated by an accessible 6-volt lamp. A geared crank facilitates smooth setting of the amperage control. All electrical and mechanical control parts that need maintenance are accessible without removing the case. Reconnection of the input circuit for 220 or 440 volts can be done without replacing any coils. An improved down draft ventilation system brings air in from the top of the case, circulates it by baffles through the windings, and prevents any air from being recirculated.

Also to be exhibited with the equipment will be a new type flux for use in hard-surfacing by automatic hidden - arc welding. With this flux a standard mild steel electrode is used, the hard-surfacing elements being contained in the flux and alloyed in the arc. The adaptation of man-

ual Lincolnweld equipment for semi-automatic hidden-arc welding to a gasoline engine driven welder will also be a feature of the Lincoln exhibit. This 600-ampere capacity unit is an addition to the company's line of gasoline engine driven welders, and is especially adapted for outdoor work such as required in pipe-line welding.

A new technique of automatic welding which has proved successful in a limited number of industrial applications will also be demonstrated. This is the twin-arc process of hidden-arc welding involving a unique, yet simple method of feeding two electrodes in tandem to deposit metal into a single crater. Speeds up to double those normally obtained with automatic welding have been successfully applied to several jobs, including railroad car frame building and tank construction.

#### Landis Semi-Automatic Turbo-Jet Blade Hydraulic Grinding Machine

Five surfaces of turbo-jet blades are ground in one operation on a semi-automatic machine just announced by the Landis Tool Co., Waynesboro, Pa. This machine has been designed for rapid precision grinding of all types of blades, buckets, vanes, and nozzles

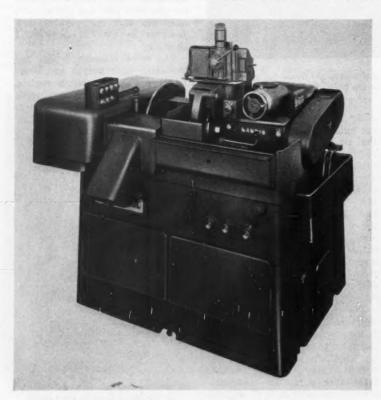


Fig. 1. Turbo-jet blade hydraulic grinding machine built by Landis Tool Co.

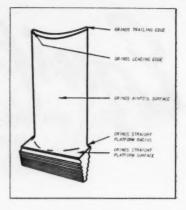


Fig. 2. Diagram of turbo-jet blade indicating five surfaces ground in one operation on machine shown in Fig. 1

now being used in jet engines. It is built to insure the production of work-pieces which are uniform in size and shape. An important feature of this machine, shown in Fig. 1, is the large, 24-inch diameter wheel which will grind the leading and trailing edges of the blades in addition to the external airfoil surface, platform, and platform radius, as illustrated in Fig. 2. Twisted, warped, or broken-back contours, straight contours, and blades with parallel or non-parallel sides can all be precision ground on this machine. Fig. 3 shows the Landis turbo-jet blade grinder set up for grinding the contour of a bucket blade.

Most of the blades ground by this machine have a contour or airfoil shape which varies from root to tip. To grind this shape, as well as the leading and trailing edge, the grinder uses a rocking cradle and a master cam. As the 24-inch grinding wheel traverses along the work-piece, the follower moves along the master cam. The grinding wheel is profile dressed and, in addition, is dressed on the corner for grinding the radius adjacent to the straight platform. Automatic hydraulic wheel dressing is used for generating this shape on the wheel.

The machine can be set for a variety of cycles, depending on the part to be ground and the desired method of handling. As an example, on parts without twist, a plunge grinding cycle can be used. On a typical forged steel bucket, 1/8 to 3/16 inch of metal is removed from the forging in one pass.

Master cams can be easily re-

Fig. 3. Close-up view of Landis turbojet blade grinding set-up for contourgrinding a bucket for jet engine

moved when changing over from one contour to another. Hydraulic and electrical controls are grouped for convenient operation and variable rates of hydraulic traverse are provided for both the wheelbase carriage and overhead dresser. The hydraulic grinding feeds are variable and can be adjusted to suit the work-piece. It is possible for one operator to run a battery of these machines.

#### Dial Indicator Gage for Checking Large Diameters

A dial indicator gage for checking large diameters has been added to the regular line of dial bore gages made by the Boice Mfg. Co., Box 1098, Poughkeepsie, N. Y. This new gage was originally designed for use in the jet engine industry but is applicable wherever the problem of checking large inside or outside diameters is encountered.

The gage is of light tubular



construction and is equipped with any required style of indicator. The gaging contact is made retractable to facilitate insertion in the bore. The depth at which the bore is gaged is controlled by rests which contact the face of the work-piece.

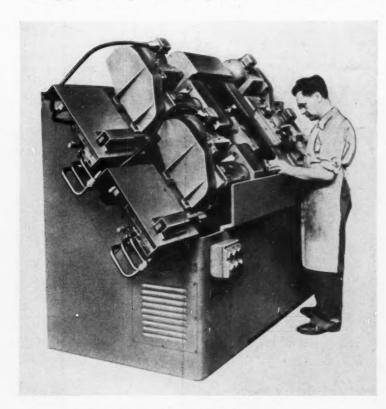
#### Heald "Bore-Matic" for Machining Wrist-Pin Holes

Wrist-pin holes in pistons can be bored at the rate of 700 parts per hour on a Model 355 "Bore-

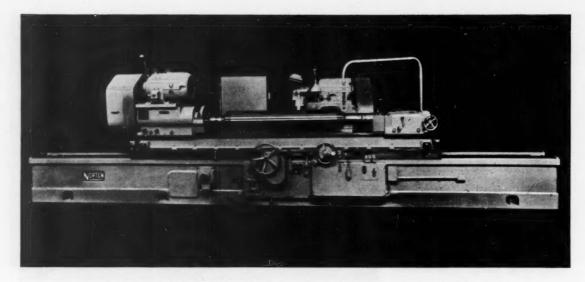
Matic" recently built by the Heald Machine Co., Worcester 6, Mass. The operations performed by this machine consist of semi-finish boring, finish-grooving, and chamfering. Basically, the machine consists of four special hydraulic cross-slides mounted on a fabricated base with a two-station hydraulically operated fixture positioned between the slides. A boring head and related drive equipment are mounted on each slide. The slides are located at an angle of 40 degrees to the base to facilitate rapid loading and operation.

While the rear opposing slides of this machine are engaged in boring one piston, the front slides are at rest and permit unloading and loading the work. After the piston is positioned in the front station, a "memory" button is operated which, following completion of boring at the rear station, automatically clamps the part and starts the second half of the cycle.

The boring heads run continuously, and the coolant for each station, which is piped through the clamping ram into the piston, shuts off automatically as the cross-slides for each station reach the rest position. The piston is hydraulically clamped, using the outside dome end, and the rough wrist-pin bosses on the inside of the piece as clamping surfaces.



"Bore-Matic" equipped for rapid machining operations on pistons



Heavy-duty cylindrical grinding machine built by Norton Co. in plain and semi-automatic types

#### Norton Heavy-Duty Cylindrical Grinding Machine

A heavy-duty Type C-2 cylindrical grinder built as a plain or a semi-automatic machine in 18-, 24-, or 30-inch swing, and in work lengths of 48, 72, 96, 120, 144, or 168 inches has been announced by the Norton Co., Worcester 6, Mass. This machine has been developed to provide the means for lowering costs in grinding large cylindrical work. In addition to a fast grinding action, it offers new features designed to reduce costs by simplifying set-up and operation, and by reducing maintenance requirements. All feeds and speeds are controlled from the operating position.

Operation is considerably simplified by several important features. One of these is the combination graduated feed handwheel and "click-count" indexing mechanism which indicates the amount of feed as the wheel is rotated past a fixed pointer. This permits settings to be made for the work diameter instantly without visual attention in increments of 0.0001 inch.

Further operating ease is provided by an arrangement through which table speeds for truing and grinding are independently adjustable and pre-set. Work-jogging is controlled by a lever.

Other design features include an automatic or manual control of work rotation and coolant flow, and an automatic adjustable wheel feed at table reversals with automatic resetting of the wheel-head. Separate dwell controls are provided for each end of table reversal,

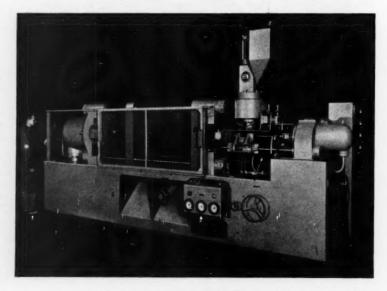
This semi-automatic machine also has the advantage of one-

lever control of its grinding cycle. When operating on the electrically timed cycle, the operator need only load the machine and touch a control lever. The machine then completes its cycle automatically.

#### Pre-Plasticizing Injection Molding Machine

An injection molding machine, which plasticizes the molding powder before it comes in contact with the injection plunger, is now being offered to the plastics industry by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio. This H-P-M Model 400-P-48 preplasticizer is an entirely new ma-

chine designed especially for maximum versatility. It has a 48-ounce shot capacity, high injection speed, mold clamp capacity of 400 tons, daylight opening of 54 inches, 30-inch mold clamping stroke, and large mold mounting space of either 25 1/2 by 36 inches or 40 by 21 1/2 inches.



H-P-M pre-plasticizing injection molding machine

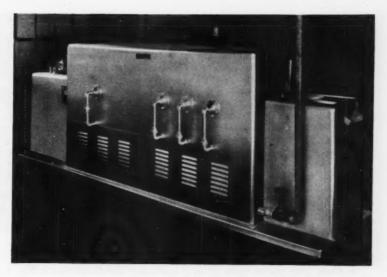
The machine produces parts up to 14 inches in depth. It can also be quickly adapted for the production of shallow parts by the installation of a ram spacer. Typical deep parts which can be produced with this equipment include refrigerator drawers and trays; table and portable radio cabinets, telephone bases, bread boxes, etc.

This machine has fast plasticizing rates, low injection and clamping pressures and produces relatively strain-free parts. Good color dispersion for dry coloring is obtained. Parts are produced at low mold temperatures with minimum distortion and a saving in weight.

#### Furnace for Annealing Brass Stampings Between Drawing Operations

A continuous type furnace for annealing brass stampings between drawing operations has been built by the Waltz Furnace Co., Department C, 1901 Symmes St., Cincinnati, Ohio. The furnace is gas-fired by eight burners with individual mixers. The combustion blower, control valve, gas regulator, and variable-drive mechanism are mounted within the casing.

A small, rubber-tired wheel—shown at the extreme left in the illustration—drives the conveyor belt by pressing it against a large ball-bearing mounted idler pulley.



Waltz continuous type furnace for annealing brass stampings

The temperature control instrument can be seen at the left on the loading section.

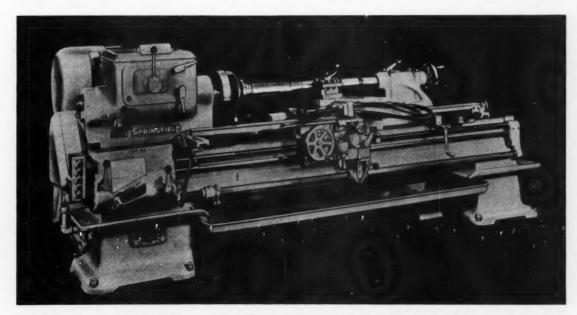
This furnace can be built in

practically any size and for many different purposes in either openfired or controlled-atmosphere, full muffler types.

#### Contouring Attachment for Springfield Lathes

An improved, simplified hydraulic contouring attachment designed for greater sensitivity and accuracy has been developed by the Springfield Machine Tool Co., Springfield, Ohio. This attachment is built for use in turning, boring, and facing shafts, axles, rotors, and other parts that have

varying diameters, tapers, shoulders, radii, and flanges. Pilot or control circuits, remote control valves, and similar elements have been replaced by a motor-driven hydraulic pump, relief valve, and oil reservoir which comprise a single, self-contained power unit. This unit supplies hydraulic pres-



Springfield lathe equipped with improved hydraulic contouring attachment

sure to the servo-valve and the fully universal hydraulic compound rest. Templates are securely held at the front of the lathe in full view of the operator.

With the carriage or cross-slide feed engaged, the stylus scans the full size template, transferring motion through the lever arm directly to the servo-valve that meters the flow of oil which controls the hydraulic cylinder. As the piston is stationary on the tool-slide, movement of the cylinder results in movement of the tool. The servo-valve is so sensi-

tive that the slightest pressure is sufficient to move the tool.

A simple, electro-mechanical control governs a variable drive which maintains a constant cutting speed as the lathe tool follows a varying contour.

Opposed hydraulic pressures in the hydraulic cylinder serve to hold the slide securely for heavyduty cutting. The turret toolpost permits a wide variety of tooling arrangements, including long tools for contour boring. The compound rest can be swiveled to the best angle for machining each job.

# Drum Type Turret Lathe with Pre-Selector and Electric-Hydraulic Control

A drum type turret lathe with sixteen tool-holding stations, preselector, and electric-hydraulic control of speeds and feeds is being introduced in this country by the Kurt Orban Co., Inc., 205 E. 42nd Street, New York 17, N. Y. This machine, known as the "Gildematik," is built by Gildemeister & Co., Germany, for precision machining of small and medium-size pieces. It is especially adapted for finishing small short pieces that must be held within close tolerances. Many small pieces of this kind can be economically produced in one complete cycle of the "Gildematik," including all operations from feeding the stock to cutting off the finished part.

The machine illustrated in Fig. 1 will take 2-inch bar work. Machines of the same basic design are also made with bar opening capacities of 1.57 and 2 1/2 inches. Chucking work in diameters up to approximately four times the nominal diameter of the bar stock capacities can be handled, using a chuck such as shown at the left in Fig. 2.

The axis of the indexing drum turret is located between the bed guides as shown at the right in Fig. 2. The center line of a tool hole in the turret, when in its top indexing position, coincides with the center line of the machine spindle. In addition to its longitudinal movement, the indexing

drum type turret can be swung around its own axis to permit such operations as facing, forming, plunge-cutting, and cutting off.

Tools in three different holder positions can often be used in one indexing position of the drum turret. Also it makes no difference whether one or more tools are used in a given position, as the turret drum can be indexed any number of tool hole spacings at one time. Lengthwise and transverse movements of the turret are limited by easily set stops. The vertical cut-off slide on the bar chucking arrangement is actuated by a hand-lever operated against an adjustable stop.

The thread chasing equipment and lead arrangement for dieheads have new features developed to simplify and speed up threading work. The short lead collet is located immediately behind the chuck, as shown in Fig. 2. The thread chaser slide can be located on either side of the lead arm which is shown in the raised position in Fig. 1. Indexing of the thread-cutting fixture and the lead arrangement, or the lead alone, automatically actuates a speed servo control, previously selected. This equipment is designed to cut accurate right- or left-hand internal and external threads. It has the advantage of being able to cut threads that are too large to be produced by taps or thread chasers.

Power is transmitted by the motor through V-belts with gears arranged to impart the desired speeds and feeds to the machine. The drive and transmission units of this equipment can be removed separately from the machine base. Gear and hydraulic units can be removed and replaced in fifteen minutes, thus permitting maintenance work on gear-box, feedbox, and hydraulic units to be performed with a minimum loss of production time,

Servos governing the hydraulic units are actuated either from the operator's position or from the pre-selector drum seen in Fig. 3. The controls shown at the right of the four-spoke wheel in Fig. 1 permit pre-selection of speeds and feeds for a succeeding operation while one machining operation is in progress. Control is either automatic or manual. Hand settings can be made either with or without the machine in operation.

The first control wheel at the

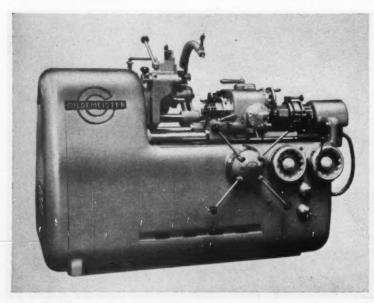
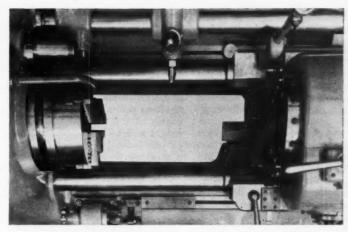


Fig. 1, "Gildematik" drum type turret lathe designed for rapid production of small precision parts, introduced in this country by Kurt Orban Co., Inc.



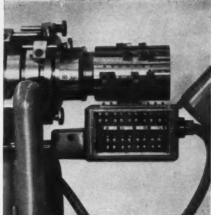


Fig. 2. (Left) View showing tool-holding end of sixteen-hole drum type turret and chuck equipment of turret lathe. Fig. 3. (Right) Electro-hydraulic pre-selector which permits automatic setting of speeds, feeds, and reversal of rotation for each of the sixteen tool positions of drum type turret

right of the four-spoke wheel shown in Fig. 1 permits setting of speeds from 16 to 2800 R.P.M. in a total ratio of 1 to 180, and the second wheel sets ten longitudinal and ten transverse feeds in a ratio of 1 to 20. The speeds and feeds selected are actuated by pressing the button at the center of each wheel. Pressing these buttons actuates the corresponding servo units which, in turn, put in operation the hydraulic units.

An outstanding feature of this machine is its provision for automatic setting of speeds, feeds, and reversal of rotation for each one of the sixteen tool hole positions in the drum turret. Electrohydraulic servo units act automatically, without lost time, when a light pressure is exerted against the indexing lever. The electrical arrangements of these controls are shown in Fig. 3. The servo drum has slots and holes corresponding to each tool-holding position in the turret which are provided with identifying marks. Trip-dogs are set in these slots and holes to control the speed, feed, and direction of rotation.

When indexing from one tool hole to the next, the corresponding trip-dogs actuate electrical servo units located directly below, and these, in turn, pass on their impulses to the hydraulic controls. This arrangement permits overriding of the automatic controls by the hand controls at any time. Thus the hand controls will override, but they do not affect the automatic controls, nor is resetting necessary after the hand

controls have been used. Operation of the hand controls, when overriding the pre-set automatic controls, is exactly the same as when using the hand controls alone-that is, the desired speed and feed are set and the actuating button is pressed. Since both actuating buttons at the centers of the control wheels have their electrical wiring circuits in parallel, only one of them needs to be pressed to obtain the desired feed and speed. Thus the same magnets, hydraulic valves, and pistons can be operated from different points of the machine,

Setting of the trip-dogs is so easily accomplished that the use of the servo drum is said to be economical even for runs of less than twenty pieces. Advancing, retracting, braking, loosening, and changing of the direction of rotation of the turning spindle are all accomplished by means of the control lever which may be seen between the feed and speed preselector wheels.

Longitudinal movement of the tool-slide is accomplished by means of the large four-spoke wheel at the left of the pre-selector wheels. Switching from hand to automatic longitudinal feed is possible at any time. A light pressure against any of the four handles of the four-spoke wheel engages or disengages the automatic feed. The precision adjustment stops for the longitudinal feed, arranged in the bed of the machine, can be seen in the upper left of Fig. 3.

For handling hot-rolled, drawn bar stock, the machine can be furnished with a hydraulically actuated bar feed and collet, and with a hand-operated cut-off slide. The chucking collet actuates the advancing and retracting movements of the bar.

#### Crush-Dresser Developed for "Diversimatic" Centerless Grinder

A crush-dressing unit designed for exclusive use on its "Diversimatic" centerless grinders will be demonstrated at the Metal Show in Philadelphia by the Diversified Metal Products Co., 5125 Alcoa Ave., Los Angeles 58, Calif. This crush-dressing unit has a precision ground roll of the desired profile which is crushed against and imparts its shape to the grinding wheel. The speed of the grinding wheel is greatly reduced during the dressing operation. Where finish is important, complicated profiles can be rough-turned on screw machines and centerless ground over the entire surface at high speed and to extremely close tolerances. When the difference in diameters is relatively small, many parts can be ground direct from the solid.

The crush-dressing unit has a rigid, cast-iron harp-shaped frame mounted on top of the main spindle housing. This frame supports a vertical, dovetailed column which is equipped with a sliding knee. The removable crush-dressing roll and drive mechanism is mounted in the adjustable knee.



DoAll electrical comparator with four gaging ranges

#### Electrical Comparator

The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has placed on the market a line of electrical comparators. Each gage provides four gaging ranges and, therefore, serves the purpose of four single-range comparators.

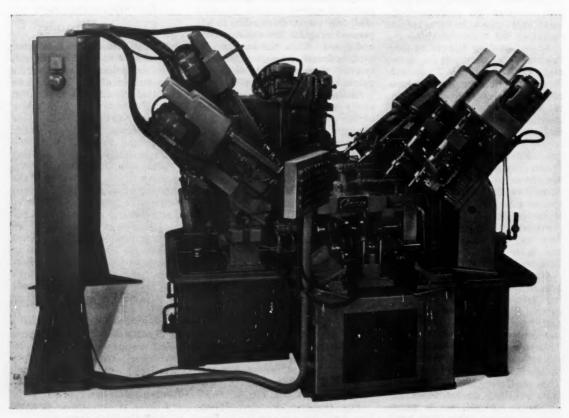
Through the simple operation of flicking a switch any one of the four gaging ranges is selected so that parts can be checked with the range best suited to their tolerances. For example, one comparator model, No. 10, affords fullscale ranges of plus or minus 0.000020, 0.000040, 0.000200, and 0.000400 inch. In the 0.000020inch range, each meter division has a value of 0.000001 inch, and parts can readily be checked to a millionth. In the 0.000400-inch range, each meter division has a value of 0.000020 inch so that parts can be rapidly checked to within 0.000020 inch when closer readings are not required. These comparators are designed to utilize the electro-magnetic principle of magnifying the movement of the spindle tip.

Spindle pressure is adjustable from 4 to 40 ounces, the desired pressure being instantly set by means of a knob and calibrated dial. A spindle lifter facilitates checking very small or delicate

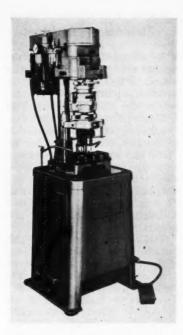
parts. Spindle tips are made of long-wearing boron carbide. The gaging head swivels 360 degrees in both horizontal and vertical planes, and can be removed for use in special gaging set-ups or in remote indication set-ups. The standard comparator models in the new series have a gaging capacity of 6 1/2 inches maximum height and 4 inches for depth. A column is available which provides a checking height of 20 inches.

#### Avey Transfer Type Crankshaft Drilling Machine

The Avey Drilling Machine Co., Cincinnati 1, Ohio, has announced the completion of a transfer type crankshaft drilling machine designed to drill lubrication holes in tractor crankshafts. The machine incorporates the "Torquematic Control" developed to eliminate drill breakage. Transfer of the crankshaft through the machine is accomplished automatically through hydraulic indexing. This machine has a production capacity of approximately sixty crankshafts per hour.



Transfer type machine for drilling crankshafts recently built by the Avey Drilling Machine Co.



Tapping and drilling machine developed by Ettco Tool Co:

# "Ettco-Emrick" Tapping and Drilling Machine

The Ettco Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y., has announced the development of a new electric-air-controlled tapping and drilling machine designed for use with either multiple- or single-spindle drilling and tapping heads. This machine has provision for interchangeable work-holders, and will handle a wide range of drilling and tapping jobs at high production rates. A feature of the machine is a patented electrically controlled fourway air valve with an up-and-down speed control.

The machine can be run on a continuous automatic cycle basis or it can be used for single-stroke operation with foot or hand control. Indexing fixtures or workholders, as well as multiple heads, can be built to handle a large variety of parts. Single-spindle tapping attachments that take taps up to the 3/4-inch size are supplied from stock.

#### "Tufbak" Waterproof Sandpaper

The Behr-Manning Corporation, Division of Norton Co., Troy, N. Y., announces the development of a waterproof sandpaper for industrial use known as "Tufbak Speed-wet Durite Paper." Free cutting action and maintenance of the initial sharp "bite" necessary in wet sanding are outstanding qualities claimed for this product. An entirely new, extremely tough backing is used to give maximum flexibility, increased body strength, and resistance to creasing, cracking, and curling.

This combination of toughness and flexibility increases durability and resistance to skidding and peeling of grit. These advantages are said to be obtained whether the sheet is soaked in the usual liquids for a few minutes or hours.

#### Carborundum and Bell Develop Abrasive Belt Method of Producing Tapered Aircraft Skins

A method of tapering aircraft skins through the use of abrasive belts has been jointly announced by the Carborundum Co., Niagara Falls, N. Y., and the Bell Aircraft Corporation, Buffalo, N. Y. The new method is said to offer the possibility of lowering costs, obtaining better finishes, reducing equipment costs, and improving production rates.

The process involves the use of a wide-belt machine such as shown in Fig. 1, on which the abrasive belt seen in Fig. 2 operates in conjunction with a "61" rubber-faced contact roll developed by the Carborundum Co. It is possible to take cuts up to 1/10 inch in depth across aluminum sheets up to 72 inches wide. Polishing the aluminum sections can be handled on the same machine through a simple change of the abrasive belt to a finer grit finishing belt. Tests have shown that varying tapers can be generated easily with this abrasive method and finished skins produced at a fast rate.

Quick clamping, as well as accu-

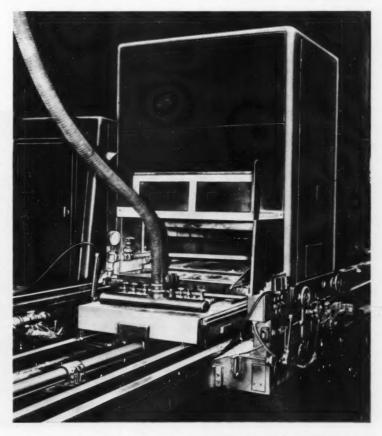


Fig. 1. Wide-belt abrasive machine adapted for new method of producing aircraft skins announced by Carborundum Co. and Bell Aircraft Corporation Abrasive belt has been removed to show rubber-faced contact roll.

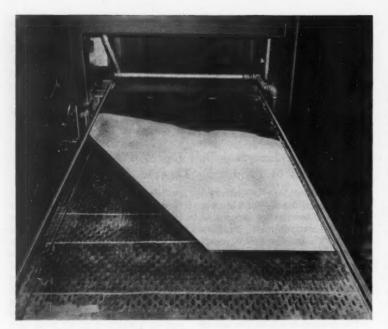


Fig. 2. Close-up view of machine shown in Fig. 1 with wide abrasive belt in place over rubber-faced contact roll, and aluminum plate in work position

rate and steady holding of the sheet, is accomplished through the use of a vacuum chuck.

With the abrasive belt method, tolerances are easily held to plus or minus 0.005 inch. Micro-finishes as low as 10 r.m.s. are achieved with the fine grit belts.

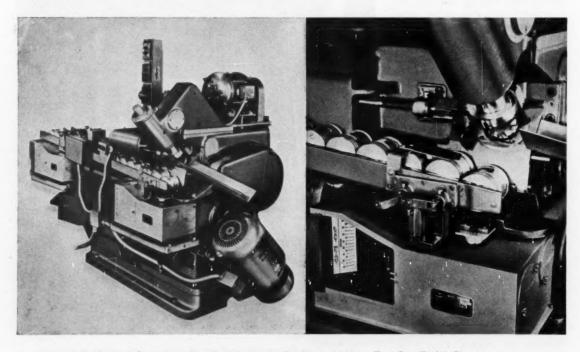
The work temperature is kept below 100 degrees F., hence no metallurgical changes take place in the material. Under actual test conditions, abrasive costs have been found to be from twelve to fifteen cents per pound of aluminum removed.

#### Morris Automatic Piston Balancing Machine

A piston balancing machine developed for high-speed, completely automatic balancing of pistons in automotive plants has been brought out by the Morris Machine Tool Co., Court, Harriet, and Vogt Sts., Cincinnati, Ohio. Pistons used in automotive engines or other internal combustion engines—which must be of uniform weight to insure perfect engine balance and smooth operation—can be balanced on this machine. It is designed to handle both cast-iron and aluminum pistons.

The pistons balanced on this machine are of the conventional design, and have a pair of metal pads, one on each side adjacent to the open end of the piston skirt. The pads are cast with an excess amount of metal which permits the removal of a sufficient amount to bring the piston to the correct weight required for balancing.

The pistons are automatically fed to the balancing machine by gravity along a channel type conveyor. If a piston has been accidentally fed to the conveyor in an inverted position, a test finger will strike the piston head, and the linkage controlled by the finger will lock the piston in this posi-



(Left) Piston balancing machine brought out by the Morris Machine Tool Co. (Right) Close-up view of pistons in balancing machine

tion until it has either been inverted or removed from the conveyor line.

Pistons which are passed by the test finger move on to be initially weighed and graded. If the piston weighs less than the designed weight, it is rejected through an "underweight" chute. If it weighs more than the maximum prescribed, the piston is rejected through an "overweight" chute. Pistons which are overweight, the overweight being equal to or less than the maximum, are allowed to pass on. The overweight and underweight chute doors are solenoid-controlled by the weight grading scale.

Pistons within the prescribed weight limits are gravity fed along the conveyor to a second scale. A mechanism allows the foremost piston to move to the second scale and arrests the pistons which follow. As the piston rests in the pan of the second scale, its weight is recorded by the position of the scale beam. A dashpot dampens the beam oscillations. When the beam comes to rest, it is clamped in place to record the weight of the piston. The position at which the scale beam is locked determines the depth of cut to be made by the milling cutter.

After the piston has been weighed on the cutter setting

scale, it is raised to a cutting station by means of a transfer arm. At this station, a collet holds the work in place while the milling cutter advances along the axis of the piston and trims the pads in accordance with the predetermined setting of the scale beam. This brings the weight of the piston to the specified limit within plus or minus 1 gram. After trimming, the piston is transferred to a discharge conveyor.

#### Cleveland Double-Action Toggle Press

A single-crank, double-action toggle press arranged for twin drive has been announced by the Cleveland Punch & Shear Works Co., Cleveland 14, Ohio, This press is equipped with the company's patented drum type friction clutch having a spring-loaded brake. It has an air counterbalanced slide and is provided with an auxiliary air brake on the flywheel. This brake permits the flywheel to be brought to a quick stop when the press is being shut down. The outer, or blank-holder, slide has air-loaded safety links.

The press has a stroke of 20 inches, adjustment of 10 inches, and a shut height of 42 inches. The bed is 48 by 48 inches, and the press capacity is 200 tons.



Double-action toggle press placed on the market by the Cleveland Punch & Shear Works Co.

Operating speed is twelve strokes per minute. A pneumatic cushion in the bed has a capacity of 35 tons at an air pressure of 100 pounds per square inch with a 9inch travel.

#### Steel Drawer Units Which Can be Assembled to Fit Shop or Office Space

The Standard Pressed Steel Co., Box 887, Jenkintown, Pa., has developed welded, all-steel drawer units which, bolted together is scores of combinations, can be tailored to fit almost any shop or office space. The drawers can be used one on top of the other in tiers of from two to five or more, or can be used singly. They are made of heavy-gage steel and are completely enclosed. Units can easily be assembled to stand on the floor, in cabinets, and on bench tops, to hang from bench tops, or to be fastened to tool stands and desks.

Drawer units, finished in "SPS" green, are available in three standard sizes: 14 inches wide by 15 inches long by 5 inches deep; 14 by 20 by 5 inches; and 20 by 20 by 6 inches. A base comes in three



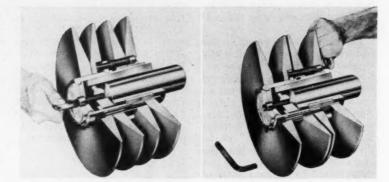
Drawer tier units brought out by the Standard Pressed Steel Co. for assembling to suit shop or office requirements

sizes to match the drawer dimensions for use under the tier when it is to stand on the floor. Drawer handles are recessed for safety. Padlock attachments are standard. Cylinder locks and sliding trays are available as extras.

#### Dodge Variable-Speed Drive

A variable-speed drive incorporating the "Taper-Lock" principle has just been announced by the Dodge Mfg. Corporation, Mishawaka, Ind. Components comprising this variable-speed drive developed to cut "down" time are: a variable-pitch motor sheave; a set of wide range belts; a companion sheave; and a slide type motor base. The "Taper-Lock" principle is used in the bushings for both sheaves to obtain rapid and easy speed changing. The sheave assembly is locked on the motor shaft as a unit by simply turning a screw.

The pitch diameter is changed easily and positively by means of a one-point adjustment. The single adjusting screw may be located at either end of the sheave, although normally the sheave is assembled with the adjusting point located on the motor side. The pitch diameter can be set accurately, and the cylinder speeds held to extremely close limits.



Cut-away views of Dodge variable-speed drive with "Taper-Lock" bushing

The precision grooved companion sheave in the drive is factory balanced, and held firmly to the shaft by the bushing to insure true running. The sliding

base of the motor permits changing the center distance of the drive to preserve proper belt tension as the variable-pitch sheave is adjusted for different speeds.

#### Ram Type Turret Lathe

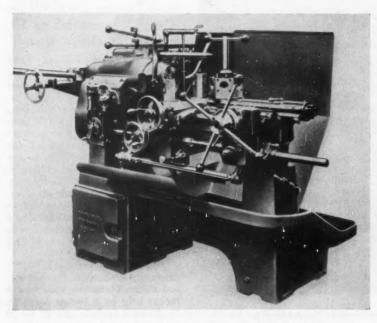
A Ward ram type turret lathe is being introduced in this country by the British Industries Corporation, 164 Duane St., New York 13, N. Y. This turret lathe is designed for heavy-duty high-speed production of components from bars in sizes up to 1 1/4 inches in diameter, or from castings, forgings, or billets up to 7 inches in diameter.

The spindle of this machine is of the flanged nose type, and is rigidly supported in combined radial and axial thrust precision ball bearings and heavy-duty roller bearings. Twelve spindle speeds are available, ranging from 48 to 2041 R.P.M.

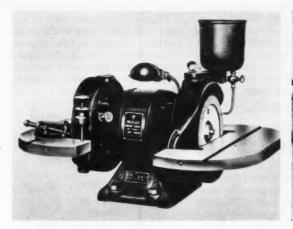
A feature of this turret lathe is the built-in cam type automatically operated spindle brake. The spindle is stopped instantaneously when operating at any speed by simply moving the clutch lever to its central position. This feature facilitates the chucking of hexagonal or square parts for second operation work and considerably reduces idle time.

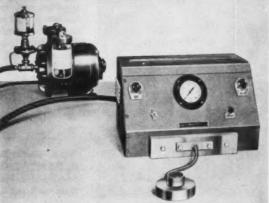
Longitudinal power feeds are available for both the turret-slide and the cross-slide saddle. The turret-slide has six rates of feed ranging from 0.0025 to 0.0167 inch per revolution. The 1-inch diameter holes in the hexagon turret permit the use of standard American screw machine and turret lathe tools. Special tool-holders with overhead pilot bushings are supplied for use in conjunction with the overhead pilot-bar to assure sustained accuracy in turning and boring operations.

The bed of the turret lathe is made of a special grade of nickel-chromium cast iron. The bed ways are protected from chips, dirt, and other abrasive materials by stainless-steel covers. These covers move with the saddle and pass under the headstock for close-to-the-chuck operation of the cross-slide. The machine weighs over 3000 pounds.



Ward heavy-duty turret lathe introduced by British Industries Corporation





Improved bench grinder built by Thomas Prosser & Son

Vacuum tester introduced by Gits Bros. Mfg. Co.

#### Improved Bench Grinder

Thomas Prosser & Son, 120 Wall St., New York 5, N. Y., are manufacturing a Model "AA" bench grinder equipped with a 1/2-H.P. motor to supply sufficient power for any bench grinding requirement. This grinder is provided with a large shaft to minimize vibration and withstand additional torque.

The grinder has all of the regular Prosser features of quick, exact angle setting and rigid table lock, as well as added power and increased ruggedness.

#### Gits Vacuum Tester

A low-cost vacuum tester that is said to be exceptionally versatile has just been introduced by Gits Bros. Mfg. Co., 1866 S. Kilbourn Ave., Chicago, Ill. This new product is designed to test countless items, including shaft seals, diaphragms, cylinders, bellows, castings, small fuel tanks, pneumatic valves of all types, manifolds, miscellaneous aircraft parts, etc. Tests to reveal porosity or surface fissures or to "prove" lapped surfaces, ground surfaces, or surface flatness can be made with this equipment. The unit can also be used to test the effective sealing of complete assemblies and the operating efficiency of air cylinders.

The complete unit comprises a vacuum pump and an instrument panel with an attached testing plate. It is light in weight and is readily portable. The plate size and composition are standard, but may be varied to meet needs.

Optional equipment includes a remote control starter. The tester may be purchased with or without the vacuum pump. A single

vacuum pump will operate several test panels. The vacuum and time cycles can be adjusted independently of each other.

#### Colonial Vertical Broaching Machine for Finishing Blind Surfaces

An ingenious broaching set-up has been developed by the Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich., which permits the use of standard broaching machines for the finishing of surfaces so positioned that the broach cannot pass completely beyond the work. The machine on which this set-up is now

being used is basically a Colonial 6-ton, 42-inch stroke single-ram vertical broaching machine.

The set-up shown by the closeup view, Fig. 1, produces twelve slots of identical shape on rightand left-hand stationary brakeapplying cams for army tanks. These cams are 20 inches in diameter and, as seen in Fig. 2, have

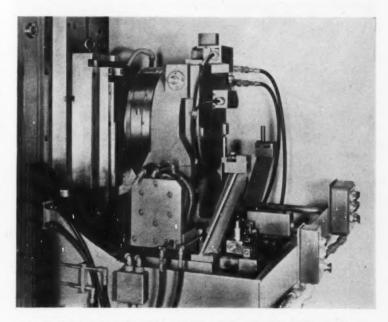


Fig. 1. Close-up view of broach and fixture used on 6-ton Colonial single-ram broaching machine to produce "blind" slots in tank brake-applying cam rings

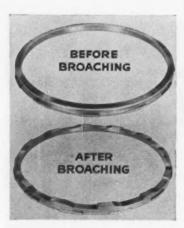


Fig. 2. Rings before and after machining on the Colonial broaching machine shown in Fig. 1

slots which are not diametrically opposite each other. In effect, the slots are "blind," and do not permit passing a broach completely across the cam rings. The broach travels only 17 inches to produce each slot and returns to the top of the stroke in position to finish another slot without touching the opposite side of the ring.

In operation, the ring-shaped cam is loaded on the trunnionmounted indexing fixture on the receding table of the single-ram machine. The fixture is then pivoted on its trunnions to a vertical position by a hydraulic cylinder. The table shuttles into position and one of the slots in the part is broached, after which the table recedes and the part is indexed on the hydraulically controlled fixture. The table again shuttles into position for cutting another slot. All indexing and shuttle actions are automatically controlled.

#### Black "Center-Finder" Vise

The Black Drill Co., Inc., 1400 E. 222nd St., Cleveland, Ohio, has developed a vise designed to save time and cut the cost of finding centers on work regardless of its shape. Two opposed pneumatic cylinders are mounted on a castiron base with two master jaws at the ends of rods attached to the pistons. The jaws travel along guides, and the movement of both jaws is mechanically synchronized. The vise operates on 5 to 100 pounds air pressure depending upon the force wanted at the jaws. Clamping pressures up to 2000 pounds may be obtained.

The force exerted on the jaws is in a straight line from the air cylinders. No pressure is transmitted through the synchronizing mechanism at any time, its only function being to guarantee uniform jaw travel to both open and closed positions.

In operation, the jaw tolerance

minus 0.001 inch of the established center lines both horizontally and vertically. However,

from the established center line

is plus or minus 0.001 inch at any

position. The center of the work-

piece is brought within plus or



Work-centering vise brought out by Black Drill Co., Inc.

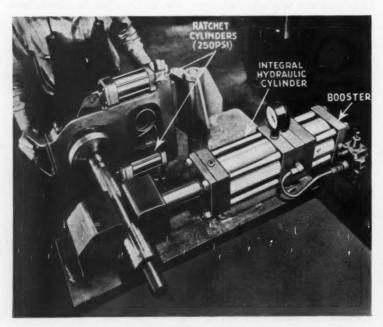
each jaw is independently adjustable from the center line to accommodate work-pieces which are not symmetrical.

#### Booster-Powered Bench Type Clamp

Holding a polished chromiumplated steel piston-rod securely under a clamping pressure of 15 tons to permit fast economical assembling of piston and followers on the rod is an unusual job performed by a clamping device designed and built by the Planet Products Corporation, Cincinnati, Ohio, in collaboration with the Miller Motor Co., 2040 N. Hawthorne Ave., Melrose Park, Ill. A small inexpensive hydraulic pump, operating at a pressure of only 250 pounds per square inch, furnishes power for actuating the entire device.

The clamping pressure is obtained by the use of a regular Miller 5-inch bore fluid pressure booster with a booster ratio of 6.25 to 1 which drives a 5-inch bore high pressure hydraulic cylinder, the piston-rod of which operates the movable clamping member. The booster and cylinder are assembled integrally as a single compact unit with no high pressure piping between them. Brass V-jaws on the clamp prevent marring of the polished finish on the rod under the tremendous clamping pressure developed.

A feature of the device is the tightening adapter for the piston and follower assembly. This



Hydraulically operated booster-powered bench clamp developed for assembling piston-rod and follower

adapter is hinged to swing away from or toward the clamped rod and contains a circular tightening disc that can be turned clockwise or counter-clockwise, as desired, by ratchet action of two smallbore hydraulic cylinders operating at a pump pressure of 250 pounds per square inch. One of the ratchet-operating cylinders is mounted at the top and the other at bottom of tightening adapter. In the flat face of the circular tightening disc are holes spaced to receive steel pins which protrude at right angles to the disc face and lock into tightening holes in the piston follower.



Precision rotary table brought out by the Kenco Mfg. Co.

#### Kenco High-Precision Rotary Table

The Kenco Mfg. Co., 5211 Telegraph Road, Los Angeles 22, Calif., has just announced a 12inch, high-precision rotary table especially adapted for the use of electronic, aircraft, and automotive manufacturers, supplementing its 8-inch size table. The rotary table has four longitudinal T-slots for work-clamping bolts. The table top is graduated from 0 to 360 degrees, and the dial is graduated in minutes for greater precision and closer indexing. It has an adjustable marker to facilitate rapid setting-up, and an eccentric cam which disengages the worm for high-production indexing. There is an adjustable stop for positive return and for taking up wear. Concentricity and run-out are held to an accuracy well within 0.0005 inch, and the top surface is parallel with the base within 0.001 inch.

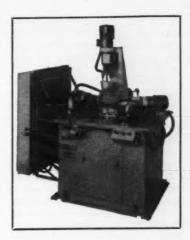
The table is provided with a hold-down ring 7 3/4 inches in diameter to provide greater rigidity. All working parts are completely enclosed. Access to the pilot hole from the under side is provided to permit the use of a

center clamp or pull-down so that machining operations can be performed on all sides of the work without disturbing the set-up.

#### Special Machine for Drilling Seven Holes Simultaneously

A special machine which drills seven accurately positioned holes simultaneously in parts produced in large quantities has recently been placed on the market by the Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich. This machine incorporates six Model KH Govro-Nelson self-contained automatic drilling units. It drills five radial holes and two parallel holes simultaneously in an aluminum part at an output rate of 500 parts per hour, or 3500 holes per hour.

The operator simply loads the part into the machine and touches the start button, whereupon the piece is automatically clamped,



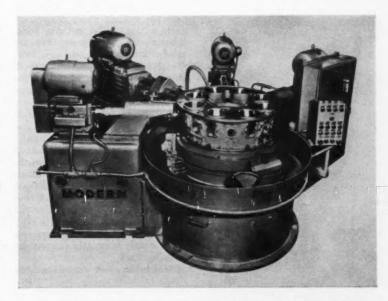
Govro-Nelson special automatic machine designed to drill seven accurately positioned holes in aluminum part

drilled, and unclamped. By varying the position of the units, the machine can readily be adapted to other drilling operations.

# Four-Way Drilling, Boring, and Facing Machine for Jet-Engine Housings

A semi-automatic drilling, boring, and facing machine has been developed by Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 4, Mich., to meet the specialized production needs for aircraft jet-engine compressor housings. This machine has four motor-operated heads located at

45-degree positions around the index table. The first head coredrills, spot-faces, and countersinks a large hole in one of four identical mounting bosses located at 90-degree positions around the housing. The second head drills four holes in the pad face. The third head turn-faces the surface

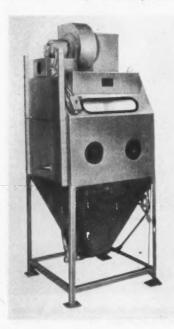


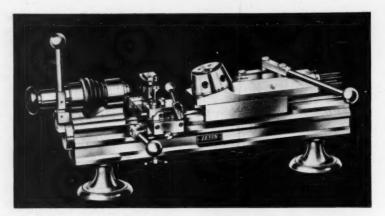
Semi-automatic drilling, boring, and facing machine developed by the Modern Industrial Engineering Co. for use in producing jet-engine compressor housings

of the pad, and the fourth finishbores the core-drilled hole. Only nine 45-degree indexes of the table are required to finish all four pads.

Manual indexing has been provided to permit inspection of both the tools and the part between successive machining operations to avoid possible scrapping of precision parts due to worn or broken tools. A compressor housing is positioned on the index table of the machine by a locating ring and a pin that fits in one of the flange holes in the housing. The part is held in position by hold-down bolts that are accessible by rotating the index table. which is supported by hardened steel balls.

In operation, the index table must be in the loading position with the index pin seated before the cycle of the machine can be started. Three air cylinders lock the index table down when the pin is in position. By pushing the cycle button the first station is energized, causing the coredrilling, spot-facing, and countersinking operations to be per-The head on the first station recedes automatically after feeding to depth. At the end of its return stroke, the index pin is automatically disengaged and the air cylinder hold-downs released, permitting the table to be manually indexed to the next 45-degree position. The machine is 15 by 18 feet and weighs 23,000 pounds.





Turret lathe for machining precision parts introduced by Louis Levin & Son, Inc.

#### Sensitive Turret Lathe for Machining Instrument Parts

To meet the demand for a small sensitive turret lathe, Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21, Calif., are placing on the market the bench type turret lathe here illustrated. This lathe is made with collet capacities of 3/16 and 5/16 inch, and is equipped

with a lever-operated collet closer, a double-tool cross-slide with a swivel compound slide, and a self-indexing six-position turret with 1/2-inch tool holes. The turret-slide of this lathe is made of hardened steel to insure accuracy and long life.

#### Abrasive Wet-Blast Machine for Obtaining Fine Finish on Production Tools

An abrasive wet-blast machine for producing refined finishes on production tools is being manufactured by Abrasive Wet-Blast, Inc., Niles, Ohio. This machine, shown in Fig. 1, employs special abrasives suspended in water and applied to the work by air pressure-as shown in Fig. 2-to obtain the refined finish desired on form cutters, gear cutters, hobs, drawing dies, permanent die-cast molds, extrusion dies, taps, etc. Metal removal is negligible with this process, close tolerances being retained on accurately machined tooling.

A wet-blasted surface is said to present an absolutely clean, oxide-free bond for plating, thus assuring no cleavage of the plating film. No chemical bath or washing is necessary. After wet-blasting, the part is simply dropped into the plating tank. The blasted surface also gives a good bond for paint or plastic coatings. If a high gloss or mirror finish is required, buffing time is greatly reduced by blasting first.

The lubrication retention abil-

Fig. 1. (Left) Abrasive wet-blast machine for finishing production tools

ity of the finish produced by wetblasting is said to result in better seating of pistons and rings, and

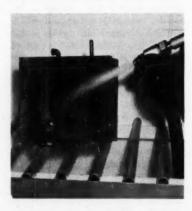


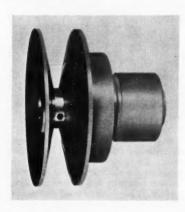
Fig. 2. Close-up interior view of wetblasting chamber of machine shown in Fig. 1, illustrating method of finishing molding die

to prevent galling. Wet-blasting has also been used successfully by aviation overhaul stations and others to finish valves, stems, and push-rods to reduce galling and burning. Timing gears, oil pump gears, and fuel pump parts present additional applications.



#### Grinding Attachment for Landis Chasers

Chaser grinding fixture brought out by the Landis Machine Co., Waynesboro, Pa., to provide an efficient, inexpensive means for grinding Landis tangential chasers. This fixture is designed to grind the compound rake and lead angles, which are essential to the production of accurate, well-formed threads. The chaser platen can be adjusted vertically to permit grinding any desired rake angle. The platen can also be rotated horizontally throughout a 360-degree circle, thus providing an accurate means of producing the desired lead angle. Knurled knobs, which have pin-holes for added leverage, securely hold the fixture in the position in which it is set. This No. 20 fixture covers chaser widths from 1 1/4 to 4 3/8 inches, and can also be used for chasers from 7/8 inch to 1 1/4 inches by using a grinding block.



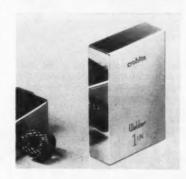
#### Variable-Speed Pulley

"Var 'A' Cone" variable-speed pulley designed on new operating principle to permit the use of standard "A" section belt. The telescopic feature of the movable disc of this pulley eliminates interlocking discs. It has been developed to reduce belt wear and vibration, and to permit infinitely variable speed changes within a 2 3/4 to 1 ratio. The unit has a maximum rating of 3/4 H.P. at a speed of 1750 R.P.M. It is simple to install and is recommended for use on

lathes, saws, drill presses, blowers, and other equipment within its power transmitting capacity. Speed changes are made while equipment is running. No lubrication is necessary, as the bushings are of the oil-impregnated type. Product of Gerbing Mfg. Corporation, Northbrook, III.

#### Webber Gage-Blocks of New Material

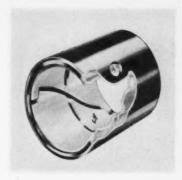
Gage-block made of chromium-carbide alloy introduced by the Webber Gage Co., 12909 Triskett Road, Cleveland 11, Ohio. This gage-block is now available under the trade name of "Croblox." The chromium-carbide alloy is said to give the block superior corrosion resistance, p'us a remarkable similarity to steel in the coefficient of expansion. The latter characteristic serves to elim-



inate the necessity for making corrections for difference in expansion between the block and a steel part when making critical measurements. The chromium-carbide alloy has remarkable resistance to wear. It takes a surface finish of 0.1 micro-inch, is lighter than steel, non-magnetic, and wrings easily in block build ups. These blocks are made in 2-, 3-, and 4-inch sizes and have Bakelite finger grips to shield them from body heat. Webber blocks made of tungsten carbide are also avai'able under the name "Carblox."

#### "Thinwall Nylined" Bearings

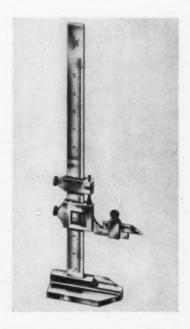
Nylon-lined bearings developed by Thomson Industries, Inc., Manhasset, N. Y., consist of a thin, drawn-steel outer sleeve and a free floating liner of duPont FM 10001 nylon. These "Thinwall Nylined" bearings are now being made in ten sizes ranging from 1/4 inch to 1 1/4 inches inside diam-These bearings were developed to offer a low-cost solution to the problems of providing clearances required to permit expansion of nylon due to temperature and moisture absorption, as well as distortion caused by internal stresses. The resilient nylon material resists poundout, decreases friction, and permits dry operation. It



also damps out mechanical vibration and minimizes abrasion failures. The bearings are corrosion resistant, and can be operated submerged in most liquids.

#### Starrett Vernier Height Gage

Vernier height gage with 13-inch scale which permits taking accurate measurements over a full 12-inch range in thousandths of an inch. This gage is made of steel throughout with a fine ground finish on all surfaces. The bottom of the base and the scriber are hardened and lapped, and the hardened bar has machine divided graduations. The scriber is easily removable for sharpening or for substituting attachments or a dial indicator. The vernier plate can be adjusted to maintain the zero point in the event of wear. This gage has just been added to the line made by the L. S. Starrett Co., Athol, Mass., which now includes three regular vernier height gages made in heights of 12, 18, and 24 inches. Other gages in heights of 6, 36, and 48 inches are also available on special order.





#### Variable-Speed Motor with Flexible Shaft Control

Lightweight "Varidrive" motor, made in fractional horsepower sizes equipped with mechanical remote control, developed by U. S. Electrical Motors, Inc., Box 2058, Los Angeles 54, Calif. The remote control includes a handwheel with indicator dial and a 5-foot flexible cable that enables the machine operator to control the speed of the Varidrive at some distance from the motor. The dial indicator is a part of the control, mak-



#### Churchill Buffing Wheel

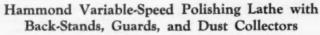
New type of finger buff called the "P-30," adapted for both hand and machine buffing. Each buff finger of this wheel is constructed by folding the cloth in pleats. This pleated construc-tion is designed to trap and hold the cutting compounds for all kinds of polishing and buffing requirements. Each pleated buff finger is set at the proper angle on the wheel to prevent gouging or streaking of the work. These buffing wheels are now being produced in all types of cloth materials and in sizes which range from 6 to 18 inches in diameter. Placed on the market by the Geo. R. Churchill Co., 7511 Fayette St., North Quincy 71, Mass.



ing it unnecessary to go to the motor to determine the operating speed. Connecting cable longer than 5 feet can be used if necessary. This "Varidrive" is available in 1/4, 1/3, 1/2, and 3/4 H.P. and in a speed ratio up to 10 to 1 over a range of 4 to 10,000 R.P.M.

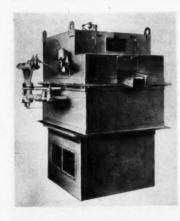
#### Molded Nylon Gears

Molded nylon gears of new line now carried in stock by the Nylomatic Division of John A. English & Co., Morrisville, Pa. Spur gears of this line are available in 48 diametral pitch, 14 1/2-degree pressure angle, with from twelve to eighty teeth. Also, not in stock but available on special order from stock molds are unit-molded 48-pitch gear and pinion combinations for use in speed reducer applications.



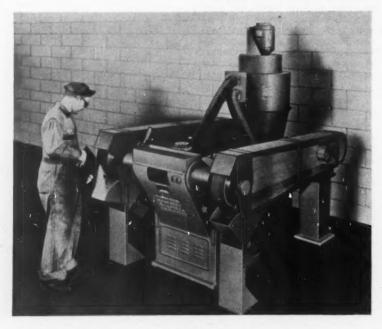
Model VRO variable-speed polishing lathe with two back-stands, guards, and dust-collecting unit recently brought out by Hammond Machinery Builders, 1600 Douglas Ave., Kalamazoo, Mich. The dust collecting unit—known as the

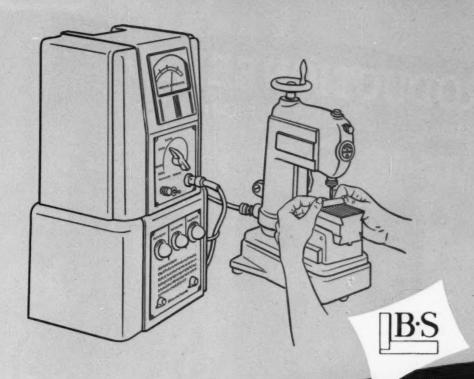
"Cyclone Duskolector"—is also a product of the company. This complete polishing equipment, together with other polishing, buffing, and deburring machines, will be demonstrated at the National Metal Show (Booth No. 1130).



#### Elmes Automatic Descaling Unit

The American Steel Foundries, Elmes Engineering Division, 1162 Tennessee Ave., Cincinnati 29, Ohio, has announced an automatic billet descaling cabinet type unit with a removable scale basket. The unit is equipped with gravity conveyor head, is fully automatic in operation, and is available in both pitmounted and floor-mounted types. The spray ring is fitted with six spray nozzles which completely encircle the billet. The nozzles are directed at both ends of the billet so as to completely remove scale at both ends. The roller conveyor is arranged to withstand extreme temperatures. Spray nozzles are readily accessible for replacement when necessary. The descaling cabinet can be supplied complete with suitable accumulator system and pumps, or with necessary operating controls for use with an existing accumulator system.





# PRODUCTIONEERED

Quality

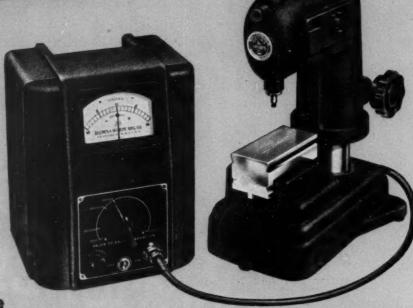
Control

Equipment

The greater the pressure for production, the greater your need for positive means to maintain quality standards at new high production rates. That is why Brown & Sharpe Measuring and Testing Equipment offers such timely advantages today. It is especially designed to minimize human error and time loss-"Productioneered" to maintain precision checks on quality at top production-line speed.

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IBS PRODUCTIONEERED for "foolproof" quality control



## Brown & Sharpe ELECTRONIC MEASURING EQUIPMENT

With this ultra-modern Brown & Sharpe Electronic Measuring Equipment, small parts inspections and gagings can be performed at highest speeds with human error practically eliminated. This equipment measures by .0001" to .00001"... amplifies gage measurements 1800 to 18,000 times... enables operators to read ten-thousandths as easily as inches—as fast as parts can be handled.

The Amplifier is unique. Its true linear response makes possible precise calibration. Separate from the measuring unit, it also eliminates temperature drift trouble by isolating the heating elements. The External Comparator (right, above), range 0 to 4", has simplified setting, adjustable measuring pressure, diamond gaging point and other features.



SIGNAL LIGHT ATTACHMENT Easily attached to the Brown & Sharpe Ampiller, this time-saving device instantly indicates, by flashing red, amber or blue light, whether work piece is undersize, within tolerance, or oversize.



ELECTRONIC CALIPER
For use with the Brown & Sharpe Amplifler. Sizes to 4". Permits precision gaging
to .0001" with work piece either on
the bench, in the fixture, or on machine.
Adjustable pressure, simplified setting.



GAGE HEAD CARTRIDGE A versatile precision unit for use with Amplifier. Can be mounted in your own igts or fixtures to perform many special jobs,



SPECIAL-PURPOSE
ELECTRONIC GAGING EQUIPMENT
Tremendous savings often may be effected in
large-volume gaging, inspecting or sorting
through electronic fixtures or devices specially
designed and custom-built by Brown & Sharpe.
Provision may be made for gaging thickness,
length, angle, parallelism, dlameter, taper or
combinations of dimensions.

# PRODUCTIONEERED to maintain precision standards



#### **Brown & Sharpe** JOHANSSON GAGE BLOCKS

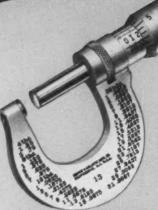
Precision Jo-Blocks enable prompt, easy detection of any wear or incorrect setting in gages that might cause high rejection rate. With them, mass-produced parts can be held to specified tolerances with minimum time-loss for checking or resetting of gages.

In addition, Jo-Blocks serve as reliable master laboratory standards for speedy, accurate setting of work standards and as positive guides for accurate layout and set-up work. Made in 3 guaranteed accuracy standards: ±.000002", ±.000004" and ±.000008" per inch. Sold as single blocks or in sets.



Among many accessories, available in sets or single units, to extend the usefulness of Jo-Blocks are: Adjustable Holders, Triangular Straight Edges, Center Points and Scribers, Sine Bars, Jaws and Foot Blocks.

# IBS PRODUCTIONEERED for on-the-job accuracy



#### **NEW MICROMETERS**

The ease of handling, clarity of reading and dependable accuracy of Brown & Sharpe Micrometers help prevent high rejection rate under stress of stepped-up production. Features include simplified adjustments, one-piece stainless steel spindle with hardened, ground threads, long-wearing carbide measuring faces. Wide range of types and sizes.

#### VERNIER TOOLS

Machine divided graduations with cut (not etched) lines, make accurate matching of graduations simpler, easier, faster on Brown & Sharpe Vernier Calipers, Height Gages, Depth Gages and Gear Tooth Verniers. Wide range of sizes.



#### DIAL TEST INDICATORS

Permit quick, easy accuracy checks for flatness, concentricity, run-out and many other relationships, with minimum loss of time or disturbance of work.
Especially valuable to set-up men, machine erectors, inspectors and toolmakers. Styles range from small attachment types to the super-rigid type, with indivioually clamped adjustments, shown here.



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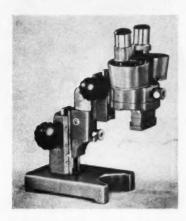


Milling Machines • Grinding Machines • Screw Machines • Cutters • Machine Tool Accessories

Machines • Johansson Gage Blocks • Electronic Measuring Equipment • Permanent Magnet Chucks • Pumps

#### Bausch & Lomb Industrial "Stereomicroscope"

Industrial "Stereomicroscope" for production, inspection, and quality control uses in industry, recently announced by the Bausch & Lomb Optical Co., Rochester 2, N. Y. This instrument is adaptable to many kinds of applications



in the factory or processing plant where it can be built into production or inspection equipment.

#### Raytheon Welding Head

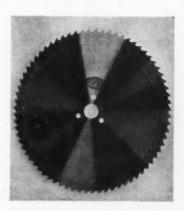
"Weldpower" Model "H" welding head developed by the Raytheon Mfg. Co., Waltham 54, Mass. This and other "Weldpower" units will be shown in operation at the National Metal Show in Philadelphia, joining metals never before welded on a production basis, including ferrous, non-ferrous, and dissimilar metals. These units make use of energy stored in the interval between welds, discharging it at the electrode tips in a pulse of high voltage and exceedingly short duration.





#### G-E Three-Piece Gear-Motor

Gear-motor designed to simplify maintenance announced recently by the General Electric Co., Schenectady 5, N. Y. This motor is built in three pieces to permit quick and easy removal of defective stators without disturbing gear components. Its unique design includes a G-E "Tri-Clad" motor; a compact, planetary gear; and a mechanical adapter. The gear, developed last year by G-E engineers, is now available in speed ratings of 780 to 13.5 R.P.M. The mechanical adapter serves the triple function of acting as the pulley endshield for the motor, the motor endshield of the gear housing, and a mechanical spacer for easy accessibility to the stator frame bolts. The motor is available in ratings of 1 to 75 H.P. for standard installations, and up to 200 H.P. for special applications.



#### Disston Chromos Metal-Cutting Saw

Segmental circular metal-cutting saw designed for exceptionally long productive life, just announced by Henry Disston & Sons, Inc., Philadelphia 35, Pa. This saw, called the "Disston Chromos," has tooth segments which are locked together in accurate alignment by flexible tightening pins arranged to permit maximum resharpening for long service and quick replacement of the segments. Available in diameters from 11 to 63 inches and with various tooth spacings for cutting any ferrous ar non-ferrous metals. Center holes are drilled to size on order.

#### Buck Independent Chuck with Minimum Overhang

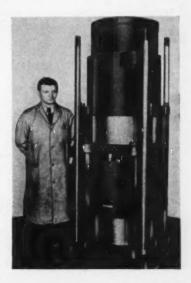
Independent chuck recently developed by the Buck Tool Co., 2015 Schippers Lane, Kalamazoo 62, Mich., which has been designed to eliminate excessive overhang. This chuck is built around rather than beyond the spindle. It is



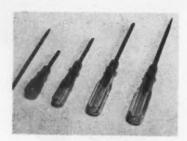
especially designed for lathes in sizes from 9 to 16 inches. An over-size operating screw serves to give the chuck exceptional gripping power.

#### Tandem Type Die Cushion for Large Punch Presses

Improved tandem die cushion designed to provide draw-ring holding pressures up to and including 45 tons announced by Dayton Rogers Mfg. Co., 2829 Thirteenth Ave. S., Minneapolis 7, Minn. Use of a combination reducing regulating valve and pressure gage makes it possible to have a nearly constant draw-ring holding pressure on all deep-drawing operations throughout the press work cycle. A hardened and ground raised



pin pressure pad is provided to compensate for limited press bed opening. The entire cushion installation is suspended at the bottom of the press bed frame by four special alloy supporting rods. Centralized lubricating equipment is provided. The reciprocating cylinders are of all-steel construction and fully guided to automatically compensate for officenter loading of the hardened and ground pin pressure pad.



#### "Click-It" Screwdrivers

Four models of a patented "Click-It" screwdriver brought out by the E. L. Dye Co., 16 W. Main St., Norwalk, Ohio, which are said to be the equivalent of thirty-two lengths and types of regular, recess, clutch-head, and Phillips head screwdrivers in both friction and non-friction styles. Adjustable blade lengths are reversible for the type desired. Length adjustments range from 3 1/2 to 14 3/4 inches with positive stop. The handles are made of plastic material of high impact strength and the blades are precision machined.

#### KSM Stud Welding Machine

Automatic stud welding machine with dual guns developed for a special application where quick, low-cost fastening is required. This machine will be



included with the stud welding equipment of KSM Products, Inc., Merchantville, N. J., to be exhibited in Booth No. 834 at the National Metal Exposition in Philadelphia. Visitors at this booth will have the opportunity to operate the newest portable stud welding guns and see each step of the stud welding process, in addition to operating an especially designed machine.

#### Keller Improved Air Hoists

Air hoist recently improved by Keller Tool Co., Grand Haven, Mich. Features now incorporated in these hoists include safety hooks which are standard equipment for the load hook, and optional for the suspension hook; improved lubri-



cation system; brake redesigned for smoother, more positive operation; bearing added to the motor drive-shaft; hardened and ground ring gears; pendent controls; and new accessories designed for operating convenience.

#### Gay-Lee Carbide Cut-Off Tool

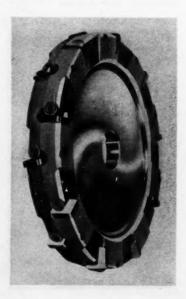
Solid carbide cut-off tool for which the Gay-Lee Co., Clawson, Mich., has obtained manufacturing and sales rights. This tool provides for strong support of the solid carbide blade, and is designed for use on Brown & Sharpe automatic screw machines. The steel hub and carbide blade are brazed to form a single permanently bonded unit. The method of holding the carbide is said to assure complete support and minimize carbide breakage and parting from the hub. A feature of this cut-off



tool is the method of grinding gashes to provide two cutting edges. This permits cutting off with the work revolving in either direction. Ten standard sizes are available.

#### Staggered-Tooth Carbide Blade Milling Cutter

Side milling cutter with staggered-tooth carbide blades that can be indexed, re-cently added to the line of "Futurmill" cutters manufactured by the Detroit Milling Cutter Co., 28625 Grand River Ave., Farmington, Mich. This 9-inch, eighteen-blade, staggered tooth, side milling cutter is designed to mill a slot 1 1/2 inches wide in an armor casting. The solid carbide blades have a 1/8inch radius ground on each corner, and when dull can simply be indexed to another cutting position. It is possible to index the blades eight times to obtain sharp cutting edges and maintain the work size within 0.001 inch. With this design of cutter the minimum width is approximately 1 1/4 inches, but straddle mills designed to cut on one side only can be made to a minimum thickness of 1 inch.



(This section continued on page 258)

# Outstanding ACCURACY TO PRODUCE IS necessary...



Slots, angles and compound angles are shaped to 0,001" limits on these solid 3140 forged steel tool holders.



Special index heads have slots accurate in shape, size, spacing and angularity to 0.001" on all dimensions.



Vee block fixtures of solid 6145 steel are completely shaped to very close limits.

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The Jordan Specialty Company . . . Shaping Specialists . . . use Cincinnati Shapers exclusively. Outstanding accuracy and versatility in production are obtained in connection with low machine investment and low tooling costs. Due to the great variety of work produced, changes from part to part must be done with minimum loss of time. Here, Cincinnati Shapers give an exceedingly profitable and outstandingly accurate performance.

Write for Shaper Catalog No. N-5 covering the complete Cincinnati line.



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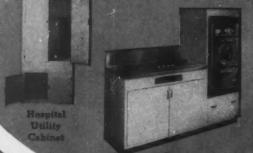
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SHAPERS . SHEARS . BRAKES

# Outstanding ACCURACY

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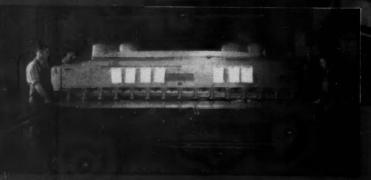




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Three Cincinnati All-Steel Shears at Jamestown Metal Products Inc.





1814 Cincinnati All-Steel Shear with hydraulic holddowns, squaring arm and front controlled power back gauge.

# is necessary...

#### THESE TOP QUALITY PRODUCTS

#### ACCURATE SHEARING

Jamestown Metal Products Inc. produces quality stainless steel equipment for hospital and home. Exact manufacturing standards are maintained.

Cincinnati Shears cut blanks accurately and to size for this equipment. Gauging must be rapid as well as accurate to handle the many different sizes required and keep production costs low.

#### ACCURATE FORMING

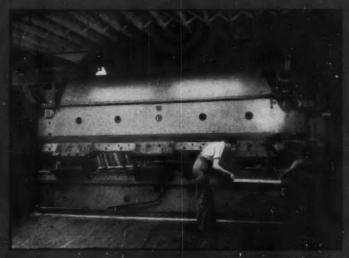
Cincinnati Press Brakes form these blanks into accurate parts that fit correctly and insure outstanding quality in the finished products as well as maintaining low assembly costs.

You, too, can expect true blanks and accurately formed parts from this profitable team of Cincinnati Shears and Cincinnati Press Brakes.

Write for Catalogs S-6 and B-3, illustrating and describing these machines.



A row of Cincinnati All-Steel Press Brakes used in the production of these quality products



A 130 x 14 Cincinnati All-Steel Press Brake 14 6 between housings tooled for multiple operations

## THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS . SHEARS . BRAKES



#### Searjeant Power Press Safety Guard

Basket enclosure type guard recently added to the line of punch press safety guards and accessories manufactured by Searjeant Metal Products, Inc., Box 81, Mendon, N. Y. This guard has been designed to meet exacting safety requirements for punch presses of all makes and types. It is available in several sizes, each custom built to specifications. The front and side barriers can be tilted in or out as required, and the vertical rods can be adjusted up or down to clear the die straps, air nozzles, etc. The whole front barrier



can be tilted up or taken off in a matter of seconds to permit removal of damaged blanks from the die. Slotted mounting brackets permit quick, easy installation or removal of the guard.

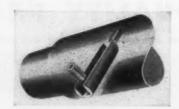
#### Universal Grinder Dog

"Red-E" universal grinding machine dog introduced by the Ready Tool Co., 554 Iranistan Ave., Bridgeport 5, Conn. This dog is adaptable for use on plain and universal jobs. It is provided with brass clamping faces to eliminate marring and damaging of soft, finished, or threaded work, and constructed to assure uniform, well balanced operation. Made in two styles with capacities of 1/4 inch to 1 1/2 inches, and 1 3/8 to 2 1/2 inches.



#### Slotted Sleeve Facilitates Installation of Tool Bits

"Novi" slotted sleeve for simplifying the installation of tool bits in boringbars, tool-holders, and cutter-heads placed on the market by Novi Tool &



Machine Co., 43043 Grand River Ave., Novi, Mich. To install in a boring-bar, one hole the size of the sleeve is reamed part way through the bar. The sleeve is held in place in the reamed hole by a pin. If permanent installation is required, the sleeve may be soft soldered or brazed in place. Two more holes are drilled and tapped for studs: one to hold the tool in place and the other as an adjustment behind the tool to prevent it from sliding away from the work. The slotted sleeve can be used for square as well as rectangular tool bits. In the latter case, two sleeves are installed with the slots facing each other. The sleeves are available in sizes for tool bits ranging from 3/16 to 1 inch in width and in any required length from 1 inch to 4 inches.



#### Oil-Mist Lubricator With Warning Switch

Oil-Mist lubricator with 1-gallon oil reservoir and built-in automatic warning switches which signal the operator by horn and red light, or shut off the machine as the oil level becomes too low. This lubricator has just been announced by the Alemite Division of Stewart-Warner Corporation, 1826 Diversey Parkway, Chicago 14, Ill. Oil-Mist units with 12-ounce reservoirs are also available with built-in warning switches.



#### "Load Lifter" Electric Traveling Crane

One of a new line of overhead electric traveling cranes built in capacities of from 1 to 20 tons by the Shaw-Box Crane & Hoist Division of Manning, Maxwell & Moore, Inc., Muskegon, Mich. These "Load Lifter" electric traveling cranes are intended to provide adequate service for average industrial requirements within their capacity range, and thus reduce operating costs. The new line is made up of three distinct types, each developed for specific requirements.



#### Precision Toggle Switch

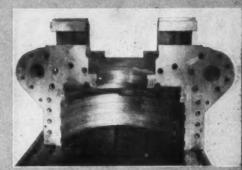
Hermetically sealed precision toggle switch whose performance and operating characteristics are said to be unaffected by environmental conditions. Although designed especially for aircraft by the Micro Division of Minneapolis-Honeywell Regulator Co., Freeport, Ill., the switch can be used in a wide variety of installations. It will deliver its full electrical rating and operating characteristics without regard to changes in atmospheric pressure or temperature, and will not corrode or be affected by dust, dirt, oil, or water. Mechanical tests indicate a life expectancy for this switch of more than 25,000 operations.

More than three million engineering hours went into the design of a late-model Air Force bomber.

# BICKFORD for big work...

This powerful Cincinnati Bickford Super Service Radial Drill was purchased to facilitate handling of "big work." It was the right machine for the job. In the complete line of Cincinnati Bickford Radial Drills, with their many outstanding features, is the right machine for you.

Write us for descriptive literature, or consult our Engineering Department on drilling needs.



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than the ones you're now using. Or you may save by the stepped-up production you get from using the finest fasteners . . . RB&W bolts, nuts, rivets and screws of uniform accuracy, dependability and physi-

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into the surface and holds tighter,

but also speeds assembly. It does

away with extra parts and special

handling. Bet your switches could

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fasteners may prove more efficient

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Use the postage-free postcard below for further information on New Catalogues described in the October, 1952, issue of MACHINERY. Circle key number of item in which you are interested and print name and address on postcard.

#### **NEW CATALOGUES**

ALUMINUM FORMING—Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky. 148-page manual entitled "Aluminum Forming," devoted mainly to a detailed explanation of how to form aluminum as it differs from other metals. There are four sections: Aluminum Sheet and Plate Data; Forming Sheet and Plate; Aluminum Tubing and Pipe Data; and Forming Aluminum Tubing and Pipe. Can be obtained when requested on a business letter-head direct to the above address.

POWDER PARTS—New Jersey Zinc Co., Front and Fletcher Sts., New York 38, N. Y. Manual entitled "Facts About Pressed Brass and other Non-Ferrous Powder Parts," presenting factors to be considered in designing and selecting small structural parts for fabrication by the powder metallurgy method. Can be obtained if requested on a business letter-head.

COPPER AND COPPER ALLOY SPECIFICA-TIONS—American Brass Co., Waterbury, Conn. Publication B-34, providing an index of up-todate copper and copper alloy specifications of the various national engineering societies and government agencies. Section I lists the most generally used alloys of the company together with the applicable specifications of the various agencies; Section II contains specifications in numeric order with a brief description of the material as to alloy, grade, type, temper, etc.

CUTTING GEAR TEETH — Cincinnati Milling Machine Co., Cincinnati, Ohio. Booklet M-1769, entitled "Cutting Gear Teeth on a Milling Machine," containing 59 pages of information on cutting worms and worm-wheels, and apur, helical, and bevel gear teeth on a milling machine—information conforming to the latest practice and intended particularly for small shops and tool-rooms.

ELECTRODES—General Electric Co., Schenectady, N. Y. Booklet GED-1634, describing the application, chemical analysis, and mechanical properties of G-E welding electrodes. The booklet includes an electrode trouble-shooting chart, a chart which specifies the number of electrodes per pound, and an explanation of the significance of the American Welding Society nomenclature.

MEASURING INSTRUMENT—Branson Instruments, Inc., Stamford, Conn. Folder describing the theory and operation of the "Coatingage" Model 600 portable instrument for measuring the thickness of non-magnetic coatings on magnetic bases and for the detection of pinholes in non-conductive coatings on conductive bases.

PRECISION LEVELING INSTRUMENT—Proft & Whitney Division Niles-Bernent-Pond Co., West Hartford, Conn. Circular 544, containing a description of the Pratt & Whitney 15-inch precision level used for checking the leveling of beds, ways, surface plates, ligs, fixtures, and any other surfaces or accessories. ........ 5

ROTATING LIMIT SWITCH — Furnas Electric Co., Batavia, III. Bulletin 5201, explaining the construction features of the Furnas rotating limit switch used to limit the travel of rotating parts of machines or other equipment such as electrically operated doors, holes, and volves.

PIPE THREADING MACHINES—Wm. K. Stamets Co., Pittsburgh, Pa. Bulletin 100-A, describing Stamets pipe threading machines designed TITANIUM AND ITS ALLOYS—Republic Steel Carporation, Massillon, Ohlo. Manual entitled "Republic Titanium and Titanium Alloys," presenting engineering data on titanium and titanium and itanium alloys—processing, physical properties, fabrication, metallography, etc.

MAGNESIUM FINISHING—Dow Chemical Co., Midland, Mich. 128-page manual describing in detail finishing systems for magnesium products, including cleaning, mechanical finishing, chemical treatments, electroplating, painting, and assembly protection.

BENDING, PUNCHING, SHEARING, AND NOTCHING EQUIPMENT—O'Neil-Irwin Mig. Co., Lake City, Minn. Cotalogue 52-19, describing and illustrating Di-Acro precision machines each as benders, parters, shears, punch presses, notchers, and brakes.

LOCK-NUTS — Industrial Fasteners Institute, Cleveland, Ohio. Booklet containing descriptions of thirty-six representative types of locknuts—an illustration of each, an explanation of the principle of operation, and the name of the manufacturer.

STAINLESS STEEL — Sharon Steel Corporation, Sharon, Pa. Booklet Intended as a guide for the use of Sharon Type 430 stainless steel an alternate material for those metals now in short supply. Typical applications are listed.

DIAMOND FINISHING—Elgin National Watch Co., Elgin, Ill. Booklet containing basic information on the characteristics of diamond as an abreaive, and on the application of diamond abreaives in finishing operations. 13

FLEXIBLE COUPLINGS—De Lavel Steam Turbine Co., Trenton, N. J. Bulletin 2200, giving complete information on the construction, horsepower ratings, speeds, applications, and selection of De Lavel crown couplings. ...... 15

MOTOR CONTROLS—Arrow-Hart & Hegeman Electric Co., Hartford, Cann. Catalogue company's industrial motor controls, including manual and magnetic starters, magnetic and reversing contactors, and push-button controls.

ROTARY STRAIGHTENERS—Mackintosh-Hemphili Co., Pittsburgh, Pa. Bulletin 52, presenting several case studies on how the company's rotary straighteners for pipe and tube have helped to solve plant production problems. 39

GEAR MATERIALS—international Nickel Co., Inc., New York City. Reprint entitled "Modern Trends in Gear Materials," treating nickel





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READERS' SERVICE DEPT.

ELECTRODE COMPARATOR SLIDS-RULE—General Electric Co., Schenectady, N. Y. Handy slide-rule designated GEN-378, which permits a comparison of GE welding electrodes with those of other electrode manufacturers. .... 25

PNEUMATIC CLUTCH AND BRAKE — Federal Machine & Welder Co., Warren, Chio. Bulletin 52100, descriptive of the Warco pneumatic clutch and brake. It also contains information on clutch and brake unit maintenance. ...... 28

MEASURING DEVICE—F. T. Griswold Mfg. Co., Devon, Pa. Catalogue 20, describing a system for measuring surface flotness by means of optical levels which utilize a beam of light as a straight line reference.

BUCTILLITE — Wheeling Steel Corporation, Wheeling, W. Va. Bulletin illustrating the production of Ductillite black plate for tinning by the cold reduction process at the Yerkyille Works of the corporation.

MYDRAULIC CYLINDERS—Lindberg Engineering Co., Chicago, III. Bulletin 701, explaining by diagram, photographs, and charts the different mounting types and capacities of Lindberg hydraulic cylinders.

COOLANT PUMPS—Ruthman Machinery Co., Cincinnati, Ohio. Catalogue presenting detailed drawings and specifications for various types of coolant pumps manufactured by the company. 32

SEALING RINGS — International Packings Corporation, Bristol, N. H. Booklet giving comprehensive data on the manufacture and application of "O-rings" as static and dynamic

ROTARY ACTUATORS — Bonnot Co., Canton, Ohio. Bulletin 21, presenting application data on Hydromators—reciprocating rotary actuators, employing air, oil, or other proper fluid medium.

DRILL JIGS Mathewson Machine Works, Inc., Quincy, Mass. Leaflet describing the Mathewson adjustable drill jig for drilling holes without lay-out on a wide variety of jobs. ....... 37

CYLINDRICAL GRINDING WHEELS — Sterling Grinding Wheel Division of the Cleveland Quarries Co., Tiffin, Ohio. Folder on cylindrical grinding wheels made by the company. ..... 38

SPEED REDUCERS — Dodge Mfg. Corporation, Mishawaka, Ind. Bulletin A-614-A, giving engineering information and selection data on the company's line of torque-arm speed feducers. 40

HYDRAULIC CYLINDERS — Miller Motor Co., Melrose Park, Ill. Bulletin H-104G, giving extensive engineering data on the company's line of hydraulic cylinders for operating pressures of from 2000 to 3000 pounds per square inch.

FLANGED AND DISHED NEADS—Joseph T. Ryerson & Son, Inc., Chicago, Ill. Bulletin listing sizes of A.S.M.E. and standard types of flanged and dished heads stocked by the company. 43

IMPACT TESTING MACHINE—National Forge & Ordnance Co., Irvine, Pa. Brochure 523, describing a low-capacity impact testing machine for plastics, ceramics, and light metals. .... 44

MEASURING INSTRUMENT — F. T. Griswold Mfg. Co., Wayne, Pa. Catalogue 30, descriptive of an optical level for the rapid measurement of flatness, straightness, and parallel m.

CYLINDRICAL GRINDING—Carborundum Co., Niagara Falis, N. Y. Booklet 9, discussing the latest developments in the field of center type cylindrical grinding.

ELECTRICAL CONTACT RIVETS—Gibson Electric Co., Pittsburgh, Pa. Catalogue C-521, listing standard sizes of flat, crowned, and pointed contact rivets. 49

FLEXIBLE METAL HOSE—Flexonics Corporation, Maywood, III. Catalogue CMH-130, covering the company's complete line of flexible metal hose and giving specifications. .. 50

WELDING EQUIPMENT—Victor Equipment Co., San Francisco 7, Calif. Bulletin 330, descriptive of Victor units for flame-cutting, heating, and welding. \$2

PRESSES — Federal Machine & Welder Co., Warren, Ohio. Booklet describing construction features of Warco straight-side double crank presses.

FILES—DoAll Co., Des Plaines, III. Bulletin 51-801, giving information on the use and application of numerous American pattern files.

HOBS — Standard Tool Co., Cleveland, Ohlo. Folder containing a tolerance chart for standard single-thread ground and unground hobs.

PUMPS—American-Marsh Pumps, Inc., Battle Creek, Mich. Bulletin 16-295, containing useful data on Triplex high-pressure pumps. .... 37

SAFETY SWITCHES Federal Electric Products Co., Newark, N. J. Booklet introducing a simplified Federal Noark front-operated safety switch.

SPROCKET WHEELS—Link-Belt Co., Chicago, III. Book 2467, listing 207 sizes of cast tooth sprocket wheels carried in stock by the company.

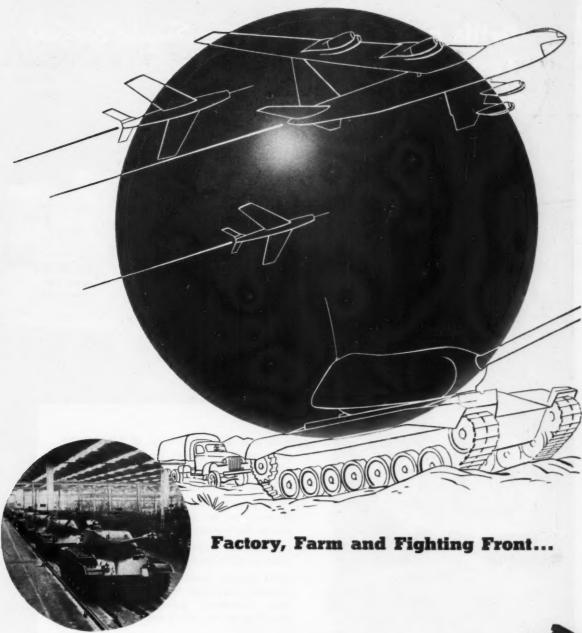
BARREL PLATING MACHINE — Frederic B. Stevens, Inc., Detroit, Mich. Catalogue 60, describing and illustrating the Stevens fully automatic barrel-type plating and processing machine.

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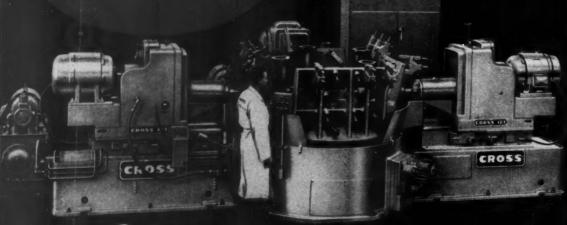


- On the Korean front . . . on farms deep in the heart of America . . . in factories geared to the needs of defense . . . New Departure Ball Bearings are worthy warriors.
- In a great variety of applications New Departures increase accuracy, permit higher speeds and resist *all* loads. They also reduce maintenance and help simplify design problems. New Departure engineers are available for everything from new design jobs to improvement of existing installations.
- The Great Ball of New Departure is the symbol of engineering excellence . . . leadership in research. Keep your eye on the BALL to be sure of your BEARINGS!



NEW DEPARTURE . DIVISION OF GENERAL MOTORS . BRISTOL, CONNECTICUT







- ★ Drills and reams two holes of 3.995/4.000 diameter in 11 pieces per hour at 100% efficiency.
- \* Material: Cast Armor, Rockwell C-42.
- Fluid motor driven index table with four stations—one for loading, one for drilling, one for flat bottom drilling, one for reaming.
- ★ JIC standard hydraulic and electrical construction with stranded wire.
- ★ Other features: hardened and ground ways, hydraulic feed and rapid traverse, pre-set tools, automatic gravity operated cam clamping for the index table.

Established 1898

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Special MACHINE TOOLS



#### RFD Doesn't RSVP

Sixteen months ago our circulation department directed a letter to someone in Tennessee, and it was just returned unopened. Must have been caught in the mailbox of a hill-billy who was waiting for the census man to come around.

#### Gourmets in Glue

A New Orleans manufacturer of specialized instruments and equipment sends a letter with a real live complaint: "Your binding department is using a glue that my roaches like and they are destroying a ten-year library of MACHINERY magazines. I have tried all kinds of roach killers but they still are eating the binding of MACHINERY. Have Tool Engineers, Blue Books, and others on same shelf which they don't touch. Most likely your first thought is to kill the beasts, but that hasn't worked. They eat the pills, then go for the MACHINERY binding. Maybe you could contact one of the other publishers and change the flavor of your glue! Hate to see these magazines destroyed but so far haven't found a solution." Memo to our bindery—Re: Roaches.

#### The Touch of Your Foot

Now the carpet opens the door! A step on an electrical control carpet molded of Vinylite resin plastisol makes electrical contact, completing a simple 6-volt circuit and opening a door which is set up for one-way traffic. A second set of controls in the carpet holds the door open until passage is cleared.

#### **Voluminous Subject**

The Society of Women Engineers convened at the Centennial of Engineering celebrated in Chicago recently. "Petticoats and Slide Rules" was the title of one speech. So interested was the audience, not a rustle was heard.

#### Raillery

A group of editors had gathered around the streamlined 100,000th freight car, exhibited in the Grand Central Terminal, preliminary to attending the Eastern Railroad Presidents Conference. Noting the absence of brake rods and other rigging found on the under side of conventional freight cars, one of the editors facetiously said "It's an outrage that we hobos can no longer ride the rods." Another editor came back with "We must boycott the railroads and I propose to take it up at the next hobo convention." An elderly woman standing nearby exploded: "I overheard what you said. Are you Americans? No, you're Communists and I shall report you to the FBI." She stood around glaring and later did obtain the name of the pseudo boycotter from a man in the party unaware of the byplay, who had been examining the huge boxcar that is to tour the nation.

BIDDING IN A BEARING—These attractive girls don't usually hold their bridge game seated in a ball bearing, we trust, because it's obvious the bearroundings have broken their concentration on the game—or whatever else it is that the ladies concentrate on while playing cards. They do, however, set off to advantage one of the precision ball bearings manufactured by the Kaydon Engineering Corporation, Muskegon, Mich., for the 90-millimeter gun mounts of the new Patton M-48 tank. The bearing measures 85 inches inside diameter.



# Mews of the Industry

#### California and Oregon

STERLING ELECTRIC MOTORS, INC., LOS Angeles, Calif., recently announced the appointment of the following distributors to handle Sterling electric power drives: CASCADE INDUSTRIAL SUPPLY, INC., 515 Market St., Klamath Falls, Ore.; SELMA FOUNDRY & MA-CHINE Co., Box 662, Selma, Ala.; W. S. WILSON CORPORATION, 11 S. William St., New York City; Roger Brown Co., 111 E. Missouri, El Paso, Tex.; HERR ELECTRIC Co., 410 W. Conway St., Baltimore, Md.; STORY ELECTRIC MOTOR REPAIR Co., 269 Paterson Ave., Little Falls, N. J.; and WOODBURY & Co., 133 S. W. Second Ave., Portland, Ore. Another announcement made by the company at this time was the appointment of HERBERT F. ZIEGLER, JR., as manager of the Kansas City, Mo., district office.

Westcott Chuck Co., Oneida, N. Y., announces that warehouse stocks have been set up at 390 Bayshore Blvd., San Francisco, and 1827 S. Hope St., Los Angeles, Calif. (under supervision of Hobelmann & Co., Inc., which represent Westcott on the West Coast); and at 320 S. 66th St., Houston, Tex. (under supervision of the company's representative, John T. Everett & Co.).

MILFORD RIVET & MACHINE Co., Milford, Conn., manufacturer of tubular and split rivets, cold-headed fasteners, and rivet-setting machines, has purchased the Pacific River & Machine Co., Alhambra, Calif. The newly acquired company will be known as the Pacific Division of the Milford Rivet & Machine Co.

DENISON ENGINEERING Co., Columbus, Ohio, manufacturer of oil hydraulic equipment, has opened an office at 565 N. Prairie St., Hawthorne, Calif., not only to serve Los Angeies and its environs but also to be headquarters for the company's West Coast sales and service.

RAY D. VILAS and E. J. McGraw have been appointed sales representatives by the Acme Steel Products Division, Acme Steel Co., Chicago, Ill., in Los Angeles and San Francisco, Calif., respectively. J. P. Brehm has been added to the San Francisco sales staff of the Division.

JOHN C. DURBIN, JR., has been appointed factory sales representative in Washington, Oregon, and Idaho for the New York Belting & Packing

Co., Passaic, N. J. Mr. Durbin will maintain his headquarters in Portland, Ore.

#### Illinois

FAIRBANKS, MORSE & Co., Chicago, Ill., announces the following changes in personnel: W. E. WATSON, manager of the Pump Mfg. Division, has been promoted to assistant to the manager of manufacturing, with headquarters in Chicago; PAUL R. FLOOD, manager of manufacturing at the Beloit, Wis., Works, has been transferred at Pomona, Calif., where he becomes general manager of the Pomona Pump Works, succeeding CHARLES L. BARRETT, who has become a consultant to the Pump Division; and Lewis H. Kessler has been named chief hydraulic engineer at the Beloit Works.

WIEDEMANN MACHINE Co., Philadelphia, Pa., has appointed the Four States Machinery Co., Chicago, Ill., representative for its complete line of turret punch presses for short-run sheet-metal piercing in the midwest—Illinois, Iowa, northwestern Indiana, western Michigan, and southeastern Nebraska.

FRED HENNIG, JR., formerly Pittsburgh district manager, has been appointed manager of the Chicago-midwestern district by Kennametal, Inc., Latrobe, Pa. He succeeds RAYMO D. B. WEEKS, who recently retired after thirteen years of service with the company. Mr. Hennig will have offices at 5830 W. 26th St., Chicago, Ill.

SERVOTROL Co., Chicago, Ill., under license agreement with the Technology Instrument Corporation, announces its entry into the field of precision potentiometers and servo components. Elmer Burns has been appointed manager of the sub-contracting operation.

SHAKEPROOF INC., Division of Illinois Tool Works, Chicago, Ill., has announced the opening of a new plant in Des Plaines, Ill., for the production of metal fastening devices and special precision stampings.

NORMAN DIRKS has joined the Modern Steel Treating Co., Chicago, Ill., assuming the duties of technical director. Mr. Dirks will, in addition, be in charge of all manufacturing operations. RICHARD M. TUTHILL was recently appointed district factory representative for the Commander Mfg. Co., Chicago, Ill., builder of the Multi-Drill and other production tools.

PECK & HARVEY, manufacturers of reproduction equipment, have purchased a building at 5650 N. Western Ave., Chicago 45, Ill., which will more than double its capacity.

SKILSAW, INC., Chicago, Ill., manufacturer of portable electric and pneumatic tools, announces the change of its name to the SKIL CORPORATION.

CHARLES SCHWARTZ has been appointed assistant vice-president in charge of manufacturing by Stronghold Screw Products, Inc., of Chicago, Ill.

#### Indiana

BORG-WARNER CORPORATION, Chicago, Ill., has acquired E. C. ATKINS & Co., Indianapolis, Ind., saw manufacturing concern. The Indianapolis company will now be known as the Atkins Saw Division. The following officers were elected: President and general manager, STANLEY J. ROUSH, formerly president of the Kerotest Mfg. Co., Pittsburgh, Pa.; vice-president, H. G. Ingersoll, who also is a vice-president of Borg-Warner and president of its Ingersoll Steel Division, and L. G. PORTER, who also is treasurer of Borg-Warner; and secretary-treasurer, D. H. Potter, who is continuing in the position he held with E. C. Atkins & Co. ELIAS C. ATKINS, who relinquished the presidency of the company which his grandfather founded, and W. A. ATKINS, previously a vicepresident, were elected members of the new board of directors.

J. W. Mull, Jr., has been appointed sales representative by the Sintercast Corporation of America, Yonkers, N. Y., manufacturer of tungsten carbide specialty items, for Indiana, western Ohjo, and northern Kentucky. Mr. Mull and his group of sales engineers have their headquarters in Indianapolis, Ind.

HAROLD E. CHURCHILL, director of research for the Studebaker Corporation, South Bend, Ind., was recently appointed chief engineer of the corporation. M. P. DEBLUMENTHAL has been advanced to the position of chief research engineer.

# S.E.C.O. SPEEDS MACHINING OPERATIONS, REDUCES REJECTS, INCREASES TOOL LIFE

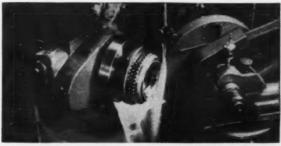
For any machining operation where an oil of its type can be used, Sunoco Emulsifying Cutting Oil will boost production, reduce downtime for cleaning and tool dressing.

A self-emulsifying petroleum product, S.E.C.O. forms a stable white emulsion when mixed with water. Its cooling and lubricating qualities make it particularly effective in the high-speed precision machining of ferrous and nonferrous metals. S.E.C.O. keeps machines clean, has a pleasant odor, and prevents rusting of parts between operations.

For complete information about S.E.C.O., write Sun Oil Company, Philadelphia 3, Pa. Address Department M-10.

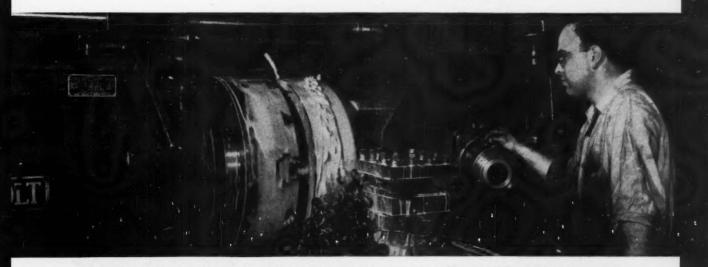


MACHINE: 2<sup>n</sup> automatic tapping machine • Parts: pipe fittings Metal: malleable iron • Operation: threading and chamfering 1½<sup>n</sup> 45° elbow • Cutting Speed: 75 sfm • Tools: high speed • Production: 306 pieces per hour • Cycle Time: 11¾ seconds • Cutting Oil: 1 part S.E.C.O. to 10 parts water



COURTESY BROWNS SHARPE MFG. CO.

MACHINE: Brown & Sharpe No. 2 Universal Grinding Machine Part: screw machine spindle sprocket • Metal: AISI-C1107 • Operation: grinding 90° included angle • Method: plunge-cut ground periphery of wheel • Grinding Oil: 1 part S.E.C.O. to 40 parts water



MACHINE: Gisholt turret lathe, model 4L • Part: 20" press mold shell, 22%" O.D., 6" depth, 201/4" I.D. • Operation: turning and boring rough forgings • Materials: 40 to 50 carbon steel • Tools: Firthite carbide • Feed: .012 at 31 rpm • Cut: 1/4" to 1/4" on O.D. and boring • Cutting Oil: 1 part S.E.C.O. to 10 parts water

#### SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. . SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



#### Michigan

MERLE E. KREMER has been appointed assistant to the president of Allied Products Corporation, Detroit, Mich. Mr. Kremer had been associated with the General Electric Co. at Nela Park, in Cleveland, Ohio, for the past eleven years. Another executive appointment made by the corporation was that of WYNNE R. LILLY, who has been named supervisor of new product development. Mr. Lilly was formerly with the Dura Corporation of Toledo, Ohio.

AETHUR COLTON Co., Division of Snyder Tool & Engineering Co., Detroit, Mich., is establishing a plant in Mancelona, Mich., to replace the plant previously occupied in Paducah, Ky. The new plant will continue to manufacture standard steel and premium steel punches and dies, and will specialize in the production of the plated units developed in Colton laboratories.

George J. Fischer has become associated with the Aeroquip Corporation, Jackson, Mich., manufacturer of flexible hose lines and self-sealing couplings, filling the position of general sales manager. Also joining the corporation is Matthew J. Betley, as works manager.

EDMUND D. BACHAND has been appointed manager of the Detroit, Mich., office of the Moore Products Co., Philadelphia, Pa., manufacturer of industrial instruments. He succeeds J. E. GAMBRILL, who becomes manager of a new branch office in New York City.

GEORGE FARNHAM and JERRY MELGAARD have recently joined the magnesium sales staff of the Dow Chemical Co., Midland, Mich., the former at the New York City office and the latter at the Chicago, Ill., office.

DETREX CORPORATION, Detroit, Mich., announces the following promotions to divisional general sales managers: L. CAMEL, Industrial Chemical Division; and D. E. WILLIARD, Industrial Equipment Division.

REXFORD C. BURNHAM is joining the J. N. Fauver Co., Inc., Detroit, Mich., in the capacity of Hydraulic Division manager.

#### Missouri and Iowa

CARL H. MUELLEZ, formerly assistant to the president in charge of product development for the Lincoln Engineering Co., St. Louis, Mo., has been appointed director of engineering, and will assume full charge of the engineering and research activities of the company.

AMERICAN CAR & FOUNDRY Co., New York City, announces the formation of an aircraft division with CLIFFORD W. SPONSEL at the head as vice-president. Mr. Sponsel was formerly vice-president in charge of operations for Brooks & Perkins, Inc., Detroit, Mich. Headquarters for the new division will be at the St. Charles, Mo., plant.

MAYTAG Co., Newton, Iowa, has announced that a new building is to be constructed which will double the facilities of its Research and Development Division. The building will be adjacent to the present research laboratory.

#### New England

CONTINENTAL SCREW Co., New Bedford, Mass., announces the following changes in the sales department: DEAN B. SKILLIN has been assigned sales representative in Delaware, Maryland, Pennsylvania, the District of Columbia, and lower New Jersey; and Frank M. Hart has been appointed sales representative in Indiana, Wisconsin, and the upper Michigan peninsula.

Dr. A. F. Dickerson is retiring as general manager of the lighting and rectifier department of the General Electric Co., Lynn, Mass. Dr. Dickerson has been with the company for forty-two years, and will continue as a consultant to the department of which he was manager.

CONTROL ENGINEERING CORPORATION, Norwood, Mass., formerly at 863 Washington St., Canton, Mass., has moved to its new plant at 560 Providence Highway, Norwood, Mass. The corporation also has announced the addition of WILLIAM D. MACGAREGILL to its sales staff.

RUSSEL V. MILLS has been named field engineer by the Bellows Co., Akron, Ohio, with headquarters at 43 Leon St., Boston, Mass. Another field engineer appointed by the company is Kenneth R. Blaisdell, for the Springfield, Mass., territory.

AMERICAN MACHINE & FOUNDRY Co., New York City, announces that its electronic subsidiary, the former Transducer Corporation of Boston, Mass., has now become the Electronics Division of the company.

JOHN H. THOMAS has been named manager of manufacturing of the East Springfield, Mass., plant of the Westinghouse Electric Corporation. Pittsburgh, Pa.

New Departure Division of General Motors Corporation, Bristol, Conn., is reorganizing its engineering department for the purpose of broadening activities associated with the research, engineering, development, and application of instrument ball bearings. Kenneth D. Mackenzie

is heading the instrument bearings activity in the position of assistant chief engineer. Mr. Mackenzie was formerly assistant plant manager of the Division's operations at Meriden, Conn. RAYMOND J. LYNCH, also an assistant chief engineer, will be in charge of all other bearing applications for the Division.

Carl Johnson has been appointed foreman of the tool-room of the Taft-Peirce Mfg. Co., Woonsocket, R. I., succeeding Fritz Hoberg, deceased. Another appointment announced by the company was that of Russell Shepherd, who has been made sales representative in the New England territory for standard products and contract manufacturing activities.

#### New Jersey

Ronson ART METAL WORKS, INC., Newark, N. J., manufacturer of Ronson lighters, has opened a new plant at N. 13th St. and Park Ave., in Newark, for the manufacture of aircraft accessory parts. The building comprises 32,000 square feet of floor space.

KELITE PRODUCTS, INC., Los Angeles, Calif., manufacturer of cleaning and processing compounds, is opening its new factory and sales office at Berkeley Heights, N. J.

WILLIAM F. TIERNEY has been appointed manager of the expanded fastenings department of the Edg-comb Steel Corporation, Hillside, N. J.

#### New York

WILLIAM L. BATT, minis er in charge of the Economic Cooperation Administration mission to the United



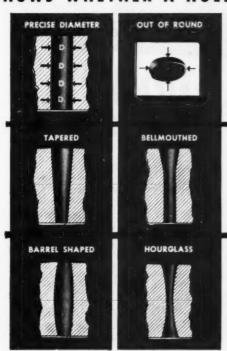
William L. Batt, who will receive the Howard Coonley Medal awarded by American Standards Association



# Precisionaire Spindles show you what plug gages can't

-and wear 10 to more than 100 times longer!

## A PRECISIONAIRE STANDARD SPINDLE SHOWS WHETHER A HOLE IS:



A Precisionaire and standard spindle shows you instantly whether a hole is dimensionally O.K.—and, if not, what the error is, where it is, and how much.

Precisionaire spindles prevent accepting bad parts in Receiving Inspection. In Production Inspection they show when and how to adjust a machine *before* scrap is produced. They prevent passing incorrect parts in Final Inspection.

Other Precisionaire spindles and fixtures for single and multiple gaging of internal and external diameters, squareness, concentricity, center distance, etc., are readily available.

#### A PLUG GAGE SHOWS YOU ONLY

Whether the hole being checked will assemble with a mating shaft of known diameter—It cannot measure any condition shown at the left.



Stock Delivery on Precisionaires—4 weeks delivery on Standard Spindles and Master Settings Rings Sizes .125 to 4.000". See your Sheffield Representative or write for new Precisionaire Catalog.



4947

the Sheffield CORPORATION

# GET UP TO 50% MORE PIECES from punches and dies made with... STORTELL Ro. 497 AIR HARDENING PRECISION GROUND DIE STOCK

UP TO 50% MORE PIECES PER SHARPENING! That is what you'll get with punches and dies made from the new Starrett No. 497 Air Hardening Precision Ground Die Stock. 5% chromium content plus a special analysis to insure good hardening properties makes it highly wear resistant — ideal for long run production dies and punches and for stamping silicon, stainless steel, Monel and other abrasive materials. Also for thread roller dies, rolls, master hubs, precision tools, gages, large blanking dies, long punches, trimming dies, forming dies, coining dies, machine parts and other precision pieces.

New Starrett Air Hardening Die Stock is non-deforming . . . no distortion, no cracking, no costly rejects, less finish grinding. It's fully spheroidized annealed for easy machining with a wide hardening range for foolproof heat treating. Order a supply today through your distributor. He'll give you prompt, dependable, quality service.

"JUST LAY IT OUT . . . AND SAW IT OUT"
For best results use Starrett Band Saws

## NOW-4 TYPES-295 SIZES

NO. 497 AIR HARDENING

NO. 496 OIL HARDENING

(Non-Deforming)

NO. 495 OIL OR WATER HARDENING

NO. 495 WATER HARDENING

Flat stock in 18" lengths, die stock in 36" lengths. Thicknesses from 1/64" to 3"—widths from ½" to 14". Each piece marked for size and type and packaged in protective envelope.



NEW FOLDER and WALL CHART lists all sizes plus formulas for air, oil and water hardening. Write for it. Address Dept. D.



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BECHANICS MAND MEASURING TOOLS AND PRECISION INSTRUMENTS
HAL INDICATORS - STEEL TAPES - PRECISION GROUND FLAT STOCK
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IN DUSTRIAL
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Prompt delivery

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270-MACHINERY, October, 1952

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AMERICAN	STANDARD	FOR	ACCURACY	OF	ENGINE	
	AND TOOL-ROOM	ROOM	LATHES-1			

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Recommended Standards		Tool Room Lethes 12 In. to 11	When Using Where Precision Precision Level Treatment of the Control of the Contro	When Using When the Company of the C	Meximum Read- Maximum Read- Maximum Read- Maximum Ing Along Longo Longo Ing	Total Indicator Ind Reading Read O to 0.0004 0 to 0.0004	Total Indicate Indica
	Engine Lather	to 18 In., 20 In. to 32 In., Incl.	When Using When Using Aresiston Level Resettings to Be Within 0.0002 in 12 In.	Whee Using Whee Using Fresides Level Fresides Level Assage Bard Assage Bard Assage Bard Maximum Read—Maximum Read—Maximum Read—Maximum Read—Maximum Read—Maximum Read—Ing to Be Within in 12 fb.	Maximum Read- ing Along Length of Eed Length of Bed Longth of Eed Longth of Bed Longth of Eed Length	Total Indicator Indicator Reading Personne (P. 0.00075)	Total Total Indicator Reading Reading to 0.0006
		40 In. to 72 In., Incl.	When Using Precision Level All Readings to Be Within 0.001 in 12 In.	When Using Precision Level Markman Read- ing to Be Within 0.001 in 12 In.	Maximum Reading Along Length of Bed in 48 In.	Total Indicator Reading 0 to 0.001	Tetal Indicator Reading 0 to 0.000775

MACHINERY'S Data Sheet No. 715, October, 1952.

Approved by American Standards Association as B5.16-1952

# AMERICAN STANDARD FOR ACCURACY OF ENGINE AND TOOL-ROOM LATHES—2

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		40 In. to 72 In., Incl.	Total Indicator Reading With Indicator on Rear Side of Test Plate 0 to 0.00075	Total Indicator Rending at End of 12 In Test Bar 0 to 0.0015 Spindle Nose 0 to 0.001	High at End of 12 In. Test Bar 0 to 0.0015	At End of 12 In. Test Bar 0 to ±0.001	Ferward at End of Spindle When Fully Extended 0 to 0.004
Standard	Engine Lathes	20 In. to 32 In., Incl.	Tetal Indicator Reading With Indicator on Rear Side of Test Plate 0 to 0.00075	Total indicator Reading Reading 12 In Test Bar 0 to 0.00128 and End of Spande Nees 0 to 0.0006	High at End of 12 In. Test Sar 0 to 0.001	At End of 12 In Test Bar 0 to ~0.0000	Forward at End sel- gondle When Fully Extended 0 to 0.0005
Recommended Standard		12 In. to 18 In., Incl.	Total Indicator Reading With Indicator on Rear Side of Test Plate 0 to 0.0005	Total Indicator Reading Reading La La Torong Do 0.000% Spindle Need of the Control of the Control of the 0.0004	High at End of 12 In Test Bar 0 to 0.001	At End of 12 In. Test Bar 0 to = 0.0005	Forward at End of Spindle When Villy Extended 0 to 0.0005
		Lathes	Total Indicator Reading With Indicator on Rear Side of Test Plate 0 to 0.0003	Total Indicator Reading at End of 12 In. Test Bar 0 to 0.0006 Spindle Wess 0 to 0.0003	High at End of 12 In. Test Bar 0 to 0.0005	At End of 12 In. Test Bar 0 to ~ 0.0003	Ferward at End of Spindle When Fully Extended 0 to 0.0005
	Test		CAM ACTION OF SPINOLE	SPINDLE TARES RANGUT	MEADSTOCK ALLEMENT - VERTICAL		MASTOOK ALSAMENT HORITONTAL

MACHINERY'S Data Sheet No. 716, October, 1952.

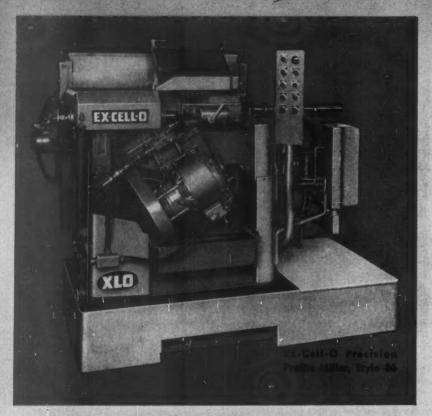
Approved by American Standards Association as B5.16-1952 FOR PRECISION IN VOLUME JET BLADE PRODUCTION

Typical let blade, the circuit form of which is emclasely and accurately milled on the Exclass of Profile Miller.

Ex-Cell-O

Automatically

Machine Mills Airfoil Automatically



The Ex-Cell-O Style 86 Precision Profile Miller is designed expressly for milling compressor blades and similar parts. It is hydraulically operated, and fully automatic except for loading and unloading.

It mills the complete airfoil form, including leading and trailing edges, working from an accurate cam made from the engineer's master glass layouts. The work, rigidly supported by roller type back rests, travels lengthwise across the cutter, and is indexed after each stroke. An index plate determines the number and spacing of indexes.

If you would like to obtain precision in volume jet blade production, get the complete "Ex-Cell-O Package" of blade finishing equipment. For details write, wire, or phone Ex-Cell-O in Detroit or contact your local Ex-Cell-O representative today.



EX-CELL-O CORPORATION DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS . CUTTING TOOLS . RAILROAD PINS AND BUSHINGS

\* AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS . DAIRY EQUIPMENT

Kingdom and former president of SKF Industries, Inc., Philadelphia, Pa., is being awarded the Howard Coonley Medal by the American Standards Association, New York City. Mr. Batt is returning from London to accept the medal at the thirty-fourth annual meeting of the Association, on November 25. The award is made annually by the Association to an executive "who by his practice and preachments has furthered the national economy through voluntary standardization."

HARRY C. MARTIN, director of research and development of the Carborundum Co., Niagara Falls, N. Y., has been elected a vice-president of the company. He will continue active direction of the company's research and development activities. Also announced was the appointment of WILLIAM J. KINGSLEY as assistant general sales manager. Mr. Kingsley has been with the company since 1922 in various sales capacities. FRED W. Scott, Jr., has been made manager of the newly established Merchandising Sales Division. Mr. Scott was formerly manager of sales for the Coated Products Division. ERNEST S. KOPECKI has joined the public relations department, and will act as assistant to the public relations manager of the company.

CLAYTON K. BAER has been appointed service engineer in the Tool Steel Division of the Crucible Steel Co. of America, New York City. Mr. Baer will make his headquarters in Syracuse, N. Y., while engaged in field work relating to applications of Crucible tool steel products. Mr. Baer has been with the company since 1941 and at the time of his appointment was general supervisor of the metallurgical department at the Sanderson-Halcomb Works, also in Syracuse.

John Alico has joined the Lake Erie Engineering Corporation, Buffalo, N. Y., designer and manufacturer of all types of hydraulic presses, in the capacity of project engineer. Mr. Alico will specialize in Lake Erie forging and extrusion press applications. Most recently he has been project engineer for two of the plants which are installing large forging and extrusion equipment under the Air Force "heavy press" program.

Precision Castings Co., Inc., Fayetteville, N. Y., announces that it has acquired the Bradley-Edlund Corporation, Cortland, N. Y., through an exchange of stock. There will be no change in management of the Bradley-Edlund Corporation, which manufactures forging hammers, drilling and tapping machines, and other types of special-purpose machinery.

JOSEPH W. HARRISON has been made technical staff assistant in the works





(Left) Harry C. Martin, newly elected vice-president of Carborundum Co.; and (Right) William J. Kingsley, assistant general sales manager

managers department of the Arma Corporation, Brooklyn, N. Y., subsidiary of the American Bosch Corporation, Springfield, Mass.

#### Ohio

TECHNICAL EQUIPMENT SALES CO. has been organized by E. B. Andrews and Harry S. Robinson for the exclusive representation in southern Ohio, Indiana, and Kentucky, of a number of well known manufacturers of machinery, machine tools, and precision measuring instruments. Formerly, Mr. Andrews was sales manager of the O. K. Tool Co., and Mr. Robinson, treasurer and general manager of the Cincinnati Shaper Co. The main office of the new company will be at 2430 Central Parkway, Cincinnati, Ohio.

RELIANCE ELECTRIC AND ENGINEER-ING CO., Cleveland, Ohio, announces the following appointments: Robert T. Jennings has been made sales application engineer in the Detroit, Mich., district office; William F. Kiser, Jr., has been appointed sales application engineer in the Philadelphia, Pa., district office; and John M. Duff has been assigned to the applied engineering and industrial sales department in Cleveland.

EARL J. MILLS will become manager of the Chicago, Ill., office of the Diamond Alkali Co., Cleveland, Ohio, succeeding the late Charles W. Klaus; and John W. Kennady, who is joining the company, will assume his duties as manager of the southwest sales office, with headquarters at Houston, Tex., effective November 1.

LEO MONROE has been named manager of the Machine Tool Division of

the Case Chemical Co., Cleveland, Ohio. Until recently Mr. Monroe was associated with the Oliver Corporation, also of Cleveland, as a methods engineer. He will now manage sales for the Machine Tool Division and direct its import-export activities.

NILS C. JOHANSON has been appointed resident demonstrator in the Cleveland, Ohio, area for the Grinding Machine Division of the Norton Co., Worcester, Mass. Mr. Johanson, who was formerly employed at the home office, replaces ALFRED C. WOMER, who has been transferred to the Abrasive Division.

HAROLD A. BURNIP has been appointed director of purchase engineering for the Lincoln Electric Co., Cleveland, Ohio. Mr. Burnip has been with the company for ten years; recently, as project engineer, he supervised the building of the company's vast plant in Cleveland.

FRANK J. FALES is joining the Nebel Machine Tool Co., Cincinnati, Ohio, in the capacity of chief engineer. He comes to the new post from the Schaible Co., also of Cincinnati, where he designed special machinery, tools, and valves.

Babcock & Wilcox Co., Beaver Falls, Penn., has announced that the Cleveland district sales office of the Tubular Products Division, has moved to larger quarters at the National City Bank Bidg., 629 Euclid Ave., Cleveland, Ohio.

W. C. SONNIE and DOUGLAS E. PORTER of the Cleveland Carbide Sales Co., Cleveland, Ohio, have been appointed representatives on special carbide cutting tools in the Cleveland territory by the Super Tool Co., Detroit, Mich.

ELMER A. KOENIC has been promoted from the position of assistant sales manager to that of sales manager of the Yoder Co., Cleveland, Ohio. Mr. Koenig has been with the company for thirteen years.

CABL R. SABE is joining the W. W. Sly Mfg. Co., Cleveland, Ohio, of which he has been elected vice-president, Mr. Sare will be primarily concerned with promoting dust filter sales.

JAMES H. Lowe has joined the Steel Founders' Society of America, Cleveland, Ohio, in the capacity of product development director.

#### Pennsylvania and Georgia

ROBERT J. PAINTER has been elected executive secretary, and RAYMOND E. HESS, associate executive secretary and editor-in-chief, of the American Society for Testing Materials, Philadelphia, Pa. Mr. Painter, who was assistant secretary and treasurer of the Society, succeeds the late C. L. WARWICK. Both men have been on the ASTM staff for many years—Mr. Painter since 1931 and Mr. Hess since 1920.

Kerotest Mfg. Co., Pittsburgh, Pa., manufacturer of brass and steel valves, has been acquired by Tube Tubes, Inc., Louisville, Ky., but will continue to be operated under its own name and retain its personnel. New officers of the company will be as follows: Chairman of the board, Grobbe Company, and vice-presidents, John G. Seller and Robert J. Landout, all of Tube Turns, Inc.

Westinghouse Electric Corporation, Pittsburgh, Pa., recently announced the following appointments: Richard T. Nalle, Jr., manager of production for the Aviation Gas Turbine Division in Philadelphia, Pa.; and Thomas G. Cameron, superintendent of manufacturing, and Donald E. Jenkins, plant manager, of the new Lighting Division plant at Vicksburg, Miss.

WILLIAM E. McCullough has been appointed Tri-State sales engineer for the Capewell Mfg. Co., Hartford, Conn., maker of hack and band saw blades, ground flat stock, etc. Mr. McCullough will be in charge of sales for western Pennsylvania, eastern Ohio, and northern West Virginia. He succeeds C. D. Libby, Mr. McCullough's address is 842 Thorn St., Sewickley, Pa.

JAMES H. SUTHERLAND has been named manager of the Pittsburgh district office of SKF Industries, Inc., Philadelphia, Pa., manufacturer of ball and roller bearings. Mr. Sutherland, who was assistant district manager at the time of his pro-

motion, will continue to make his headquarters at 1518 Grant Bldg., Pittsburgh, Pa.

W. Roy Widdoes, director of industrial relations at the Lukens Steel Co., Coatesville, Pa., has been appointed to the president's staff. He will be secretary of the management committee. William C. Robinson, currently assistant director of industrial relations, will become acting director, succeeding Mr. Widdoes.

EMMETT F. CARY, who had been district sales manager of the coupling department of Koppers Co., Inc., Pittsburgh, Pa., has been named district sales manager for the Metal Products Division, with headquarters in Pittsburgh. Mr. Cary's territory will include western Pennsylvania, West Virginia, and part of Ohio.

FRED H. Lucas has been appointed manager of structural and plate sales in the Sales Division of the United States Steel Corporation, Pittsburgh, Pa. Mr. Lucas succeeds A. H. Warren, Pa., who is retiring after forty-three years of service with U. S. Steel.

THOMAS E. PICKERING recently joined Firth Sterling Inc., Pittsburgh, Pa., as sales promotion manager. He will direct the promotional activities for all divisions of the Firth Sterling Steel & Carbide Corporation from the general office in Pittsburgh.

WILBUR GARDNER, secretary and treasurer of DeWalt Inc., Lancaster, Pa., power cutting tool manufacturing subsidiary of the American Machine & Foundry Co., New York City, was recently elected a vice-president of the subsidiary. Mr. Gardner joined the firm in 1925.

EVERETT S. HOFF, formerly production manager for the Summerill Tubing Co., Division of the Columbia Steel & Shafting Co., Carnegle, Pa., has been promoted to production manager—bars and tubes.

J. B. Lyons has been appointed southern sales representative for the Billings & Spencer Co., Hartford, Conn., manufacturer of wrenches and other shop tools. Mr. Lyons will have his headquarters in Atlanta. Ga.

### New Books and Publications

MECHANICS: Part I, STATICS; and Part II, DYNAMICS. By J. L. Meriam. Two volumes, 671 pages total, 6 by 9 inches. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price per volume, \$4.

This text, published in two parts, treats the theory and application of mechanics, and is designed for the basic mechanics courses in the normal engineering curriculum. The first volume—Statics—integrates the usual pre-engineering background of physics, mathematics, and graphics. The chapters of the book are: Principles of Mechanics; Force Systems; Equilibrium; Structures; Distributed Forces; Beams; Friction; and Virtual Work. In addition, there are two appendixes—Moments of Inertia and Useful Tables.

The second volume — Dynamics — contains the following chapters: Principles of Mechanics; Kinematics, Principles of Kinetics, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, and Periodic Motion. The same appendixes are published in this as in the first volume.

Both volumes contain many illustrated problems which apply to the various fields of engineering. The author, an associate professor of engineering design at the University of California, has made an effort to produce reality and clarity in the problems selected, and to present them in order of increasing difficulty.

TAPS AND DIES FOR UNIFIED AND AMERICAN SCREW THREADS. Published by the Tap and Die Division, Metal Cutting Tool Institute, 3114 Chrysler Bldg., New York 17, N. Y. 7 pages, 8 1/2 by 11 inches. Price, 50 cents.

This pamphlet describes the various classes of external and internal screw threads, methods of identifying limits and tolerances, proper tap selection, etc. Tables show the available standard hand taps in numbered and fractional sizes for tapping coarse and fine threads. Other tables give tap recommendations for the different classes of threads.

HANDY TOLERANCE TABLES. By Alexander Michael, Sr. Published by the Handy Length Book Co., 3507 17th St., S. W., Canton, Ohio. 144 pages, 4 by 5 1/4 inches. Price, \$2 (paper bound).

This pocket-size booklet consists of standard industrial fractions and decimal equivalents to three places, and two-place decimals with nearest fraction and difference to three places.

Welding with Stainless Steel Electrodes. Published by the Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17, Ohio. 32 pages, 5 3/4 by 8 3/4 inches. Price (paper bound), 25 cents.

This booklet is a reprint of material from the "Procedure Handbook of Arc Welding Design and Practice."



# We've Standardized Cone-Drive Gears for You!

Here are the reasons why...

- 1. Lower Cost . . . . . . As little as \( \frac{1}{3} \)rd the cost of special gear sets and speed reducers.
- 2. Faster Delivery . . . . . Your order may be shipped from stock in as little as 24 hours! Practically any size and ratio shipped within one week.
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- 4. Ready Replacement . . Use of standardized parts throughout means simple, quick and low cost replacement when required.

Why all this is possible . . . In Cone-Drive double enveloping gears there are no circular or diametral pitch limitations to consider. This vital design feature has now permitted STANDARDIZATION of right angle reduction gearing, made possible mass-production of gear and worm blanks, and simplified and speeded manufacture and assembly.

What to do . . . . . . . . Write, phone or wire today for Catalog No. 700—or better yet, ask for specifications of the STANDARD Cone-Drive gear set most nearly meeting your power and ratio requirements. They are available in ratings from fractional to hundreds of horse-power and in ratios from 5/1 to 70/1.

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DOUBLE ENVELOPING GEAR SETS & SPEED REDUCERS

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### Obituaries

#### Paul B. Greenawald

Paul B. Greenawald, vice-president in charge of promotion and a director of the Carpenter Steel Co., Reading, Pa., died on September 4 at the age of fifty-eight years. Mr. Greenawald was graduated from Pennsylvania State College with a degree in metallurgical engineering. In 1924, he entered the employ of the Carpenter Steel Co. in the metallurigcal depart-



Paul B. Greenawald

ment. He was promoted to general superintendent of the plant in 1945, and in the same year was made vice-president in charge of production. Mr. Greenawald was a member of the American Iron and Steel Institute and a director of the National Association of Manufacturers.

HUGH J. FRASER, vice-president in general charge of all plant operations in the United States of the International Nickel Co., Inc., New York City, died in Montreal after a brief illness, on August 22, at the age of fifty-five years. He resided in Larchmont, N. Y. Mr. Fraser was born in Brockville, Ontario, and was graduated from Queen's University. He joined the Huntington, W. Va., Works of the International Nickel Co., Inc., in 1923, serving in various technical and operating capacities before being promoted to assistant manager of the production department, in the New York City office.

In 1947, Mr. Fraser was elected vice-president, and the following year was appointed to the position he held at the time of his death. He was also an assistant vice-president of the parent organization, the International

Nickel Co. of Canada, Ltd., since 1943. Mr. Fraser was a member of the Canadian Institute of Mining and Metallurgy, the American Institute of Mining and Metallurgical Engineers, the American Society for Metals, and the Mining and Metallurgical Society of America. He is survived by his wife and two daughters.

MORITZ O. KOPPERL, executive vicepresident of the Edgcomb Steel Corporation, Hillside, N. J., died at his summer home at Laconia, N. H., on August 31, after an illness of two days, at the age of fifty-one years. Mr. Kopperl was one of the founders in 1927 of the corporation. He is survived by his wife and two sons.

## Coming Events

OCTOBER 20-24 — NATIONAL METAL EXPOSITION AND CONGRESS at the Philadelphia Convention Hall, Philadelphia, Pa. Secretary, W. H. Eisenman, American Society of Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

OCTOBER 26-29 — Semi-annual meeting of the AMERICAN GEAR MANUFACTURERS ASSOCIATION at the Edgewater Beach Hotel, Chicago, Ill. Executive Secretary, J. C. SEARS, 302 Empire Bldg., Pittsburgh 22, Pa.

OCTOBER 29-31 — Fifth Annual Machine Tool Conference of the American Institute of Electrical Engineers at the Hotel Ten Eyck, Albany, N. Y. For further information, contact the Institute at 33 W. 39th St., New York 18, N. Y.

NOVEMBER 5.7 — Sixteenth Annual Time and Motion Study and Management Clinic sponsored by the Industrial Management Society at the Sheraton Hotel, Chicago, Ill. Further information can be obtained by addressing the Society, 35 E. Wacker Drive, Chicago 1, Ill.

NOVEMBER 8—Second Annual Tool Engineering Conference of Chapters in Indiana, Illinois, Iowa, Missouri, Wisconsin, and western Michigan of the American Society of Tool Engineers, at the University of Illinois, Urbana, Ill. Further information can be obtained from R. K. Newton, Supervisor of Conferences, 205 Arcade Bldg., University of Illinois, Urbana, Ill.

November 19-25—Thirty-fourth annual meeting of the American Standards Association at the Waldorf-Astoria in New York. Headquarters of Association, 70 E. 45th St., New York 17, N. Y.

NOVEMBER 20-21—Seventh Mid-West Conference of the AMERICAN SOCIETY FOR QUALITY CONTROL at the Claypool Hotel, Indianapolis, Ind. For further information, address Dale A. Cue, 5565 Brookville Road, Indianapolis, Ind.

DECEMBER 1-6—Twentieth National Exposition of Power and Mechanical Engineering at the Grand Central Palace, New York City, under the auspices of the American Society of Mechanical Engineers. Executive assistant secretary, Ernest Hartford, 29 West 39th St., New York 18, N. Y.

JANUARY 19-22, 1953—PLANT MAINTENANCE CONFERENCE AND SHOW at the Public Auditorium, Cleveland, Ohio. For further information, address Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

MARCH 23-27, 1953—Eighth Western Metal Congress and Exposition sponsored by the AMERICAN SOCIETY FOR METALS, to be held in the Pan-Pacific Auditorium, Los Angeles, Calif. Secretary, W. H. EISENMAN, 7301 Euclid Ave., Cleveland 3, Ohio.

#### Army's Ammunition Program Supplies Own Brass Needs

For the past eighteen months, the Army Ordnauce Corps has supplied more than 75 per cent of its own requirements for brass and other non-ferrous metals needed to make ammunition. This accomplishment has been effected by the Ordnauce Ammunition Center located at Joliet, Ill., through its metal salvage program.

Since January, 1951, the ammunition program has increased in size to a point where about 26,000,000 pounds per month of copper and brass are now required. In the first six months of 1952, the metals salvage program supplied about 20,000,000 pounds monthly, or 77 per cent of this need. Thus, only about 6,000,000 pounds monthly has had to be procured, and the critical shortage of these metals has been substantially relieved.

Although a major portion of this scrap is recovered from the breakdown of obsolete and deteriorated ammunition (some of which has been in storage since World War II and before), another large source of supply is the fired cartridge cases and other metal components recovered from the battlefields of Korea and other overseas commands. Similiar materials are gathered up from the firing ranges and training camps of the armed forces in this country. Scrap accumulated in regular operations at the forty-eight Government ammunition factories and work-shops is likewise recovered as part of this program.



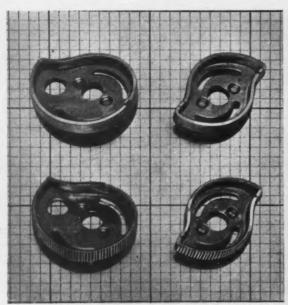


Fig. 1. Cams used for feeding and positioning paper on an automatic typewriter are serrated in the broaching set-up shown in Fig. 2.



Fig. 2. Vertical surface broaching set-up for serrating cams shown in Fig. 1. Two cams, such as seen at right, are broached at each stroke.

#### Small Cams Serrated by Surface Broaching

The pressed steel, casehardened cams shown in Fig. 1 are a part of the mechanism which feeds and positions the paper on an automatic typewriter. The cam surface on each part has to have teeth or serrations cut into it to grip the paper stock firmly. In order to function properly, the cam surfaces must be accurate. The maximum dimension on either cam is 1 inch.

The production problem of cut-

ting the teeth on such small parts was successfully solved by employing Red Ring surface broaches on the vertical set-up shown in Fig. 2. Two symmetrical cams of the design seen at the right in Fig. 1 are broached with each stroke, resulting in a production of 450 pieces per hour. The cams seen at the left are broached one at a time at the rate of 225 per hour. The broach is operated at a cutting speed of 28 feet a minute.

#### Electronic Equipment in Supersonic Aircraft

Pilots of today's supersonic aircraft could not survive in combat without the aid of electronic equipment that works faster than their own brains, according to Planes, publication of the Aircraft Industries Association. Supersonic speeds have so increased the complexity of modern military planes that the electrical and electronic equipment in the cockpit of one jet aircraft corresponds in intricacy to the combined circuits of a city power system, a radio broadcasting station, a television broadcasting station, and the fire control system of a battleship.

Without the aid of this equipment, human survival would be impossible. Theoretically, if two pilots flying at 1200 miles per hour (a speed that has been flown), emerged from a cloud on a collision course about a mile and a half apart, and were looking directly at each other, they would not see one another before they crashed head-on. They would be traveling faster than the speed of human nerve impulses.

#### Industrial Engineering Films Released by Iowa State

The Bureau of Audio-Visual Instruction of the Extension Division of the State University of Iowa, Iowa City, Iowa, has just released a revised edition of two important sound films: "Motion Study Principles" and "Motion Study Applications." The purpose of these visual aids is to show how workers can increase their output per day with the same or less effort, by being taught better and easier work methods. Both films were originally produced under the direction of Prof. Ralph M. Barnes.

"Motion Study Principles" (U - 919) has a showing time of twenty-eight minutes and presents some of the most important principles of motion economy, illustrating how these principles can be applied to specific operations. Three typical jobs are examined and evaluated. By applying the principles of motion economy in each instance, productivity has been substantially raised.

"Motion Study Applications" (U - 979) has a showing time of eighteen minutes. This film defines the most common hand motions and shows how an understanding of these motions together with a knowledge of motion study principles enables one to develop better and easier ways to work. Four representative industrial applications are considered. These 16-millimeter films can be rented.



## CORROSION STUDIES CAN INCREASE THE ECONOMY OF COPPER ALLOYS

Photograph of a section of a failed tube showing excessive thinning and pitting of the outer surface. Note also the circumferential cracks.

Copper and its alloys are notable for their resistance to corrosion under a wide variety of conditions. There are industrial applications where copper or the appropriate copper alloy should give an indefinitely long life, but where failure because of corrosion may result by reason of unsuitable design of equipment or improper control of environment. Further, there are many situations in which no commercial metal or alloy will have an extended life, but in which copper or one of its alloys possesses a combination of physical and chemical properties which render it the best obtainable material, when all factors, including ultimate costs, are taken into consideration. Hence correct specification becomes of great importance. Recognition of this by industry is responsible for the fact that the Revere Research Department devotes so much time to studying the corrosive effects of fluids and gases, and to preventive measures.

Recently a large manufacturer, who produces condensers as well as other equipment, reported that arsenical Admiralty tubes in a steam-jet ejector were failing after five years. This length of service is not too bad, but nevertheless such tubes often last much longer. Could

we make any suggestions?

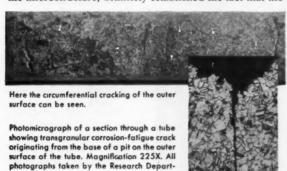
Seven failed tubes were examined for type of corrosion, metal and scale analysis. The facts were: outer surfaces were badly pitted and grooved with holes completely through in some areas; the inside surfaces were relatively untouched; cracking was circumferential, progressing from the outside; outer scale was largely cupric carbonates and copper sulfide; inner scale was calcium carbonate, cuprous oxide and some iron oxide. Microscopic examination of the cracks showed they originated in corrosion pits on the outside, progressing inward across grain boundaries, rather than along them. The transgranular path of fracture, together with other characteristics of the microstructure, definitely established the fact that the

failure was of the corrosion-fatigue type. The corroding pits on the outside created stress concentration points of weakness, from which the cracks originated. Eventually the localized stress exceeded the endurance limit of the metal and it cracked.

The conclusion was, therefore, that damage was from two sources—the first being excessive carbon dioxide and the other non-condensable gases in the steam, which caused the excessive pitting and thinning. It is not ununusual to have these and other corrodants present in damaging amounts in the air-ejector system, whereas they are not injurious elsewhere. The second cause of failure was excessive vibration somewhere in the unit which was responsible for the corrosion fatigue failure.

RECOMMENDATIONS. The copper-base tube alloy that generally possesses the greatest resistance to the non-condensable gases responsible for the corrosion of the Admiralty tubes is 5% aluminum bronze. Re-tubing with this was suggested. It was also recommended that steps be taken to effect a material reduction in tube vibration by placing a baffle in the steam inlet. In addition, it was pointed out that many operators find it good practice to discharge the after-condenser drain to the sewer instead of returning it to the system. By this means, the amount of carbon dioxide, ammonia and other gases in the system can be substantially decreased.

It is interesting to note that the Revere Research Department, located in Rome, N. Y., was able to determine these causes and suggest remedies without ever having seen the condenser. This is the result of modern equipment, and long experience in studying the problems of corrosion. If you have a problem regarding the corrosion of copper and copper alloys, or aluminum alloys, why not take it up with the nearest Revere office? Remember, corrosion that is too rapid wastes both your money and our national resources.



ment of Revere.

## REVERE

Founded by Paul Revere in 1801 230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.: New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere SEE REVERS: "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

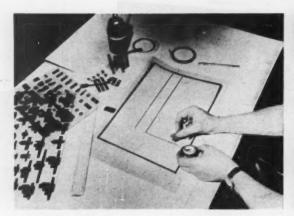


Fig. 1. Method of using lay-out tape to outline plant areas, aisles, stock-rooms, etc., before placing "Repro-Templets" on film grid lay-out sheet

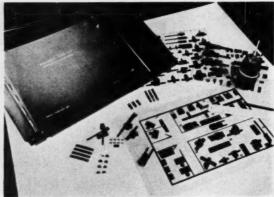


Fig. 2. Final flexible "Repro-Templet" plant lay-out on film, ready for printing in any type of commercial reproduction machine

#### "Repro-Templets" Facilitate Rapid, Accurate Production of Plant Lay-Outs

The "Repro-Templet" method of making preliminary, revised, and final lay-outs of machine building shops or plants requires no measuring of equipment, cutting of templets, drawing, drafting, or lettering. However, this method is said to enable complete lay-outs to be accurately produced in the shortest possible time.

A master planning file consisting of 5000 templets made by Repro - Templets. Inc., Oakmont, Pa., was described in May, 1952. MACHINERY, page 207. These machine tool and shop equipment templets, together with film grid lay-out sheet, 1/8-inch colored tape, and pressure-sensitive adhesive, provide all the material required to make a comprehensive lay-out.

When the lay-out is complete, it can be run through any reproduction machine — blu eprint, Ozalid, photostat, etc.—to obtain as

A 1000-ton hydraulic press, designed to operate almost continuously forms the mixture of abrasives and Bakelite phenolic bonding resins into wheels up to 36 inches in diameter and 12 inches

in thickness

many copies as needed. Because the pressure-sensitive adhesive is transparent, it will not interfere with the clarity of the print, nor will the templets applied to the film grid sheet become loose.

### Expansion Program of Simonds Abrasive Co.

A fifty per cent production increase and more uniform curing of high-speed grinding wheels molded from abrasives bonded with Bakelite phenolic resins are the goals of a recently completed modernization and expansion program of the Simonds Abrasive Co., Philadelphia, Pa. A continuous car type curing oven and air conditioning of all vital working areas make the plant unique in its ield. The new equipment includes eight-deck a b r a s i v e screening units, hydraulically powered mixers, automatic presses for highspeed shaping of small and medium-sized grinding wheels, a

large press for producing wheels up to 36 inches in diameter, an automatic three-stage curing oven, and a machine for facing cured wheels.

The concern has developed a method of injection-molding Bakelite styrene plastic modified with rubber into the center holes of grinding wheels up to 12 inches in diameter to form the arbor holes. This material has high impact resistance, and its low specific gravity reduces the danger of wheels being unbalanced by the arbor hole lining.



Steel mill products are a vital segment of both civilian and military economies and continue as the largest nickel-consuming field.

#### PROGRESS DEMANDS:

## Immediate Replacement of a Dangerous, Obsolete Tax Law Provision

**THE CASE:** The normal, healthy growth of America's industrial strength is being seriously hampered, and its military security threatened, by a depression-born tax provision of the U. S. Bureau of Internal Revenue. This obsolete provision retards plant modernization by encouraging the retention rather than the replacement of obsolete productive equipment. Both obsolete machine tools and obsolete laws must be replaced.

This damaging provision, (Bulletin "F" of the BIR —a 1942 revision of Regulation TD-4422), arbitrarily established the useful economic life of a majority of new machines at 15 to 30 years. Inequitable from the start, it has become increasingly unfair, because the rapidity of continuing technological advances now renders most machine tools obsolete, on the average, every 7 years.

Bulletin "F" continues to flout reality by forcing industry to adhere to an extended period of tax write-offs on new equipment, based on the arbitrary 15 to 30 years life span estimate. This long-term — but short-sighted — depreciation policy means that a replacement and modernization program is, for all companies, extremely difficult, and, for many, economically impossible.

#### An Example

Let's take a look at the grim results of the existing regulation; -

In 1949, over 43 per cent of the machine tools in use in this country were ten years old or older . . . and at least 95 per cent were more than 10 years old in design.

Consider the fact that a new machine today costs more than twice as much as a comparable machine, vintage 1934, and may become obsolete twice as fast.

What does this mean to the manufacturer? Take the case of a company owning a machine tool for which it paid \$5,000 in 1942. Let us assume the machine has a 20-year life, according to the present tax schedules. Thus, by 1952, the company would have recovered \$2,500 of its original investment in the machine. It wants to replace that machine with new, high-speed equipment—but replacement costs \$10,000.

If it is the company's policy to finance new equipment out of current earnings, it must earn approximately \$15,000 under a Federal income tax rate of 50% (disregarding the Excess Profits Tax) to provide the additional \$7,500 for the new machine—yet it can recover the \$10,000 invested in the new machine only at the rate of \$500 a year! For most companies, such a financial burden can be unbearable.

#### Penny-wise, Pound-foolish

TD-4422 was a depression expedient to increase tax revenue by about \$94,000,000 a year. In terms of short-range tax collections it has seemed to be profitable. Yet the tax collections on the increased earnings that would result from a more far-sighted tax regulation unquestionably would far outweigh the present revenues.

While this additional tax revenue on increased productivity is being lost, our industrial strength, too, is being sapped by these depreciation rates—the poorest of any major industrial nation. We are senselessly stunting our economic growth and weakening our national security by lowering plant efficiency in thousands of small and medium-size companies.

#### Small and medium-size producers are the sub-contractors of big industry, and comprise the backbone of our industrial economy.

Ironically, our government fully appreciates the fact that accelerated tax write-offs stimulate and quicken plant modernization, and increase production.

Proof is the fact that the government has granted many firms the privilege of 5-year amortization of capital equipment (under Certificates of Necessity). This was done to provide an incentive to purchase new high-speed machine tools, thereby gaining the added production urgently needed for defense.

How sensible and how logical it would be if government offered a similar incentive to *all* industry—without resorting to such devices as "Certificates of Necessity"!

The reduction in tax revenue resulting from discretionary write-offs would be negligible—while the potential gain in new revenue and industrial strength would be tremendous.

#### The Remedy

An immediate amendment to the Internal Revenue Code, enabling each individual manufacturer to write off his investments in equipment at whatever rate he may elect.

This urgent need transcends party lines.



Reprints of this page are available.

BIBLIOGRAPHY: May, '52, Capital Goods Review, MAPI; McDonald Statement to Senate Subcommittee; Technological Stagnation in Great Britain, MAPI;
The Iron Age, July 3, '52, pg. 113 — also The Iron Age, May 15, '52, pg. 98.

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Turret Lathes – Fay Automatic Lathes – Thread Grinders – Optical Comparators – Threading Dies & Chasers



#### How Standard's lubrication service works for Studebaker

 Look almost anywhere in Studebaker's vast plant at South Bend, Indiana, and you'll see Standard's lubrication service at work.

In one of the many operating departments, the chances are you'll find the Standard lubrication specialist who serves Studebaker. He is assigned to the South Bend area and is close-at-hand to give Studebaker the lubrication engineering assistance they need when they need it.

Almost any day at Studebaker's, you'll see a Standard tank wagon or truck delivering the petroleum products that help keep production rolling. Because these deliveries are made from a nearby Standard warehouse, they are prompt and reliable. Most of the petroleum products used in the Studebaker plant are stocked in this warehouse and

are immediately available.

All along Studebaker's assembly and production lines, you'll find Standard Oil products at work. From one of the most complete lines of fuels and lubricants on the market, Studebaker has been able to select the petroleum products that exactly fit its needs.

All of these benefits—expert engineering service, fast and reliable deliveries, a complete line of high quality products—add up to one of the reasons why Studebaker has been a Standard Oil customer for over 50 years. Make Studebaker's experience the basis for putting Standard's lubrication service to work for you. Just phone your local Standard Oil (Ind.) office and ask to have the Standard Oil lubrication specialist in your area call on you.





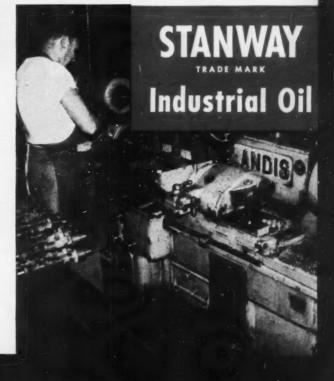
STANDARD OIL COMPANY

(INDIANA)



**STANOBAR GREASE** is used throughout the Stude-baker plant for lubrication of bearings in electric motors and oil pumps. Its high stability enables it to provide effective lubrication under a wide variety of operating conditions.

In Studebaker's many grinding machines, such as the one shown below, Stanway Industrial Oil No. 30H answers a special need by serving both as a hydraulic oil and as a lubricant for ways and guides. The high stability necessary in a hydraulic oil and the oiliness needed in a way lubricant are uniquely combined in Stanway.



# MACHINE ALL SORTS OF

PRATT & WHITNEY

Rotary feed to be table made it easy for a P & W Vertical the part to machine the three cylindrical surfaces indicated by arrows. Thus, no spensive tisteres were required.

> Surfaces in fourteen different planes on this box jig were finished rapidly and economically with a P & W Vertical Shaper. No changes in this set-up were needed.

# VERTICAL SHAPERS

- INCREASED STRENGTH
- DEDMANEUT ACCURACE
- ERWED CETAIN CHANCE
- FEWER SPECIAL MGS
- DETTED VISIBILITY
- O POWER BOTARY PEED
- EASY, ACCURATE
- CONVENIENT CONTROL
- HEAVY CUTTING and

The Handiest Machine in Your Shop"

Producing this die set—including die, die shoe, stripper—required the machining of intricate out many sharp corners. A Pratt & Whitney Vertical did the job easily and with substantial time saving



This nickel steel, twelve tooth, flexible clutch for a reduction gear mechanism has an outside diameter of 341/8". The teeth were machined to .001" accuracy on a P & W Vertical Shaper.





## IRREGULAR SHAPES

. Accuratell

### Model B TWO SIZES

6" RAM STROKE 12" RAM STROKE



Versatile, powerful and accurate, Pratt & Whitney Vertical Shapers efficiently handle a wide variety of irregular shapes that cannot be machined conveniently or economically by any other method. P & W vertical design - with all cutting pressures taken directly on the table and bed - eliminates springing and assures permanent accuracy. The cutting action tends to hold the work in place. This feature - plus the built-in rotary table with power feed - makes mounting and indexing easy. Intricate forms can readily be machined without

costly set-up changes, and expensive jigs and fixtures are

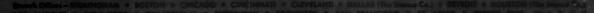
Pratt & Whitney Model B Vertical Shapers are made in two sizes; 6" ram stroke and 12" ram stroke. A wide range of work sizes can be accommodated. In the die shop, tool room, for general repair work - and everywhere that irregular shapes are handled - P & W Vertical Shapers will do your difficult jobs faster and at lower costs.

Write on your Company letterhead for Circular No. 423-8



DIVISION NILES-BEMENT-POND COMPANY WEST HARTFORD 1, CONNECTICUT, U. S. A.





MACHINE TOOLS GAGES CUTTING TOOLS



## EVERYTHING UNDER CONTROL!

## AUTOMATIC PUSH-BUTTON CONTROLLED MONA-MATIC TURNING GIVES COST CONTROL TOO— ON LONG AND SHORT RUNS

Here's high speed, automatic metal turning—every production man's dream—at its peak. Here's increased output combined with savings on setup, form tools, tool change and finishing.

The fast, powerful Mona-Matic utilizes the single Air-Gage Tracer controlled cutting tool on the front carriage for turning multiple diameters, tapers, faces, radii and chamfers. The fully automatic, integrated rear carriage tools perform necking, grooving and forming cuts. Template contours are reproduced generally to accuracies of + or

—.001"—with the single, continuous tool cut providing a smooth, stepless finish frequently requiring no subsequent grinding.

Here's a machine suitable for both first and second operation work, so completely automatic that one operator can easily service two—or more—machines. And because setup time is rarely over 25 min., the production records it has set are as remarkable in short runs as long ones!

Look over the exclusive features (listed, right) so important for success with the Mona-Matic. Then let us authenticate our story with actual production-line data that shows why Mona-Matic installations are replacing whole batteries of older equipment. Use the coupon now—and get the complete Mona-Matic story . . . . . The Monarch Machine Tool Company, Sidney, Ohio.

#### PRODUCTION TURNING AT ITS FINEST . . . THE MONARCH MONA-MATIC



Mona-Matic with Bar Feed.



Mona-Matic with Magazine Load.



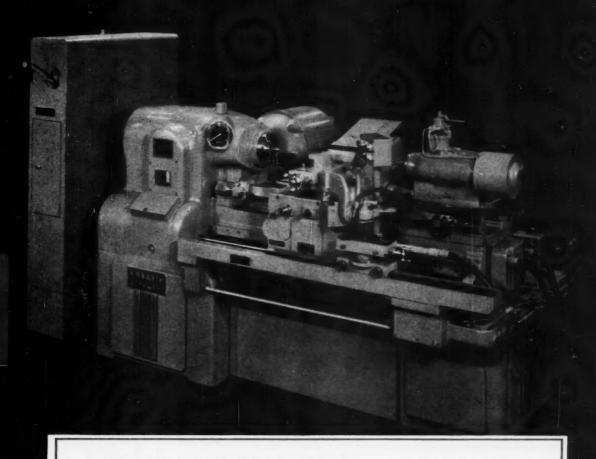
Mona-Matic with Cam Bar.



Model 15 Mona-Matic.



Mona-Matic with R-F Cycle.



## YOU GET ALL THIS IN THE MONA-MATIC

- Turning cycle is completely automatic, with rear slide operation, of course, included. The almost limitless number of cycle variations is made possible by Monarch's electronic controls. Automatic operation is foolproof, with possibility of damage or hazard virtually non-existent.
- Wide feed range is infinitely variable. With optional automatic feed change feature, as many as five different feeds (up or down) may be used during the cut.
- 3 Higher speeds are available when needed up to 3000 RPM. A 2-speed motor can also be supplied, an essential for efficient turning of many classes of work.
- 4 Accuracy far exceeding that of any other lathe duplicating method is provided by the Air-Gage Tracer. Operating on a stylus pressure of only 5 to 6 ounces, moreover, flat templates as well as round ones can be utilized with no appreciable template wear impairing accuracy even after the turning of thousands of pieces. This system, too, allows tracer replacement within a matter of minutes, if necessary.
- 5 Positive adjustment is provided for making diameter correction without influencing of length dimensions.
- 6 Design provides fall of scale and chips free of slides, prolonging accurate life of machine.



FOR A GOOD TURN FASTER . . . TURN TO MONARCH

#### THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio.

Gentlement I am interested in your Mona-Matic story and would like to receive your illustrated Booklet, with complete data and job performance reports. Please send me your Booklet 1805 without obligation.

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OIL WELL PUA OHONING DIESEL ENGINES GEARS future ONTROLS

REFRIGERATOR COMPRESSORS

AIRCRAFT ENGINES

HYDRAULIC CONTROLS

GUN BARRELS

TRACTOR PARTS

AUTOMOTIVE ENGINES

generation of accurate cylindrical or flat surfaces.

if your operation requires the

Hundreds of industrial plants have found that Microhoning not only improves the quality of the surface, but also increases production—reduces scrap, handling, and inspection costs.

No, you do not need a crystal ball.

The potentials of the Microhoning process can best be judged by the past accomplishments and present policy of the organization that developed it.

To give industry a complete service, the Micromatic Hone Corporation has an organization and sales policy unique in the machine-tool business. One well-coordinated organization sells, engineers, builds, and services the complete installation. Micromatic assumes full responsibility for all the equipment and the results obtained with the Microhoning process.



#### CORPORATION MICROMATIC

MICROMATIC HONE CORP. MICRO-MOLD MFG. DIV.

MICROMATIC HONE CORP. 1323 S. Sente Fe Avenue Les Angeles 21, Celifornia

MICROMATIC HONE LTD.

REPRESENTATIVES: OVERGARD MACHINE TOOL COMPANY, 234 Com HALLIDIE MACHINERY CO., 2726 First Ave., South, South, Wash. . REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES Vote for the DEM. TAP
"We know oil the angles"

Vote for the DEM. TAP
for a
NEW PITCH:

Production Pete is all mixed up As election day draws near. But—of one thing he is quite sure, He's going to vote this year! VOTING BOOTH PRECINCT 19 WARD 52



We need both "pitch" and "angle" To get the best work done. Pete picks a sure-fire winner And—the country's favorite son!

Bath "ground from the solid" Taps have been a successful candidate on industry's ticket for many years . . . elected to serve again and again because of many outstanding qualities.

For instance no expense is spared to produce Bath Taps to accurate pitch diameter—one of the most important dimensions on the tap. Once determined, the tap can be duplicated to exact size for Bath customers at any time.

Another important feature . . . the rake angle of Bath Taps is accurately made to your specifications—and will be exactly the same on one tap or a hundred . . . on your first or any subsequent order.

Dependability is a quality much to be admired in public life... or in a product. At the John Bath Co., you can always rely on accuracy of design, uniformity of manufacture and rigid inspection. Buy Bath Taps for Better Threads!

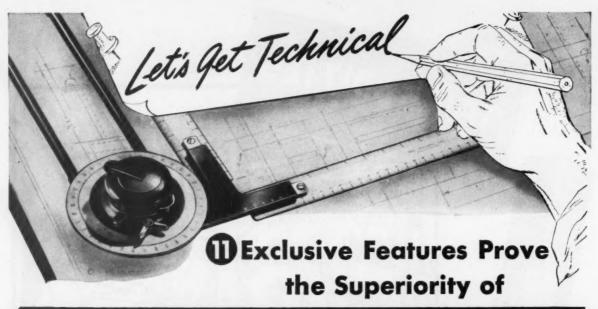


INSIST ON BATH TAPS
-- PROFIT BY THEIR
PLUS-- PERFORMANCE

PLUG AND RING THREAD GAGES . GROUND THREAD TAPS . INTERNAL MICROMETERS

JOHN

ATH CO. INCORPORATED
24 Grafton St., Worcester, Mass.



## UNIVERSAL BOARDMASTER Drafting Machine

Before you buy any drafting machine—compare—and the advantages of the Universal Boardmaster will be outstanding. And during comparison, look particularly at the time, cost and effort-saving features mentioned here and found exclusively in the Boardmaster.

- Full Vision Protractor—located above the arm. No setting is ever hidden from view.
- Pre-loaded ball-bearing protractor center not a sleeve bushing. Eliminates play. Increases accuracy, ease of operation, and trouble-free life.
- 3 Positive, draw-bar baseline clamp. More powerful by 25% to 100% than any other machine.
  Full clamping power automatically applied.
- 4 Centralized controls—always accessible. Most compactly grouped for efficent operation. Large in size—because they don't have to pass under the arm.
- Centerless index-mechanism. Locks on the diameter, not the radius. Index ring is a thick section screw machine part—not a thin stamping.
- 6 Hinged anchor. Machine lifts without strain or torque to clear obstructions.
- Readily adjustable elbow—manually, without tools—and from the draftsman's working position in front of the board.

- 8 Built-in vise-type clamp with full hand (not fingertip) grip that can really be pulled up tight.
- 9 Most glare-free protractor finish—quick reading and easy on the eyes in any light—at any angle—the result of years of research to promote eye comfort.
- 10 Adaptable, to all board angles—in the field—even for vertical boards.
- Protractor slides on nylon feet—for long life even on abrasive types of paper.



#### "DURALINE" ALUMINUM ALLOY SCALES:

Durable, glareless, machine-divided and finished in a new super-tough anodized coating that is clean, hard and permanent.

Write today for detailed descriptive literature on the Boardmaster Drafting Machine and the new sight-saving Duraline drafting machine scales.

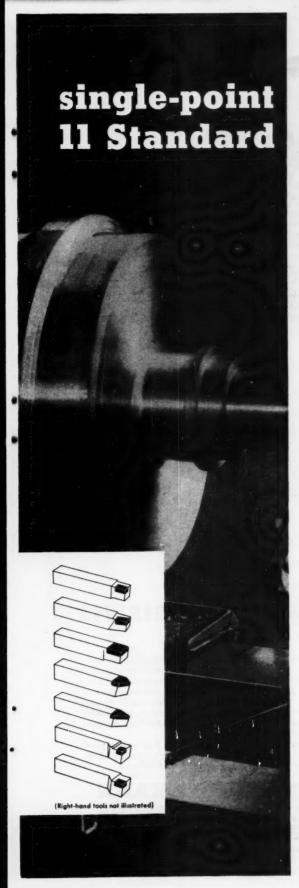
UNIVERSAL DRAFTING MACHINE Corporation

7960 LORAIN AVENUE

CLEVELAND 2, OHIO

**GLEASON CURVIC® COUPLINGS** Ground Curvic® and Zerol face couplings are produced automatically on the Gleason No. 19 Curvic® Coupling Grinder with a uniformity which makes each part interchangeable. Use of self-centering built up sections, perfectly aligned through fixed coupling teeth, simplifies manufacture and materially facilitates reassembly of large units to their original standard of precision.





## single-point machining with 11 Standard Carboloy Tools

11 Standard Carboloy Tools will do up to 80% of all your single-point turning, facing and boring ... eliminate hundreds of costly, inventory-loading special tools.

What's more, fast-cutting Standard Carboloy Tools boost production as they chop tool and maintenance costs. This has been proven in all types of shops on an industry-wide basis. Tipped with the quality brand of cemented carbides, Standard Carboloy Tools easily outproduce and outlast steel tools by as much as 10 to 1 or more.

#### Cut faster, better, for less

Why not test Standard Carboloy Tools on your toughest job? Prove for yourself that whether used "as is" or quickly and economically ground to special shapes in your own toolroom, Standard Carboloy Tools will do your single-point machining jobs faster, better, for less.

And don't overlook the plus-values in Standard Carboloy Blanks. They're available in many styles; mass-produced at low cost in hundreds of sizes. They're easily brazed to tool shanks to handle those emergency jobs, without time or money wasted waiting for specials.

#### Extra carbide benefits

Carboloy-Developed Services lead to more efficient selection, design, use and maintenance of cemented carbide tools, result in *extra* carbide benefits. Services include Customer Training School, technical manuals, charts, catalogs, low-cost slide films . . . and on-the-job assistance of skilled Carboloy engineers to crack specific carbide problems.

Write for complete Carboloy General Tool Catalog, GT-250, or contact your local Carboloy Sales Engineer or Authorized Distributor today.

"Carboloy" is the trademark for the products of Carboloy
Department of General Electric Company

## CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

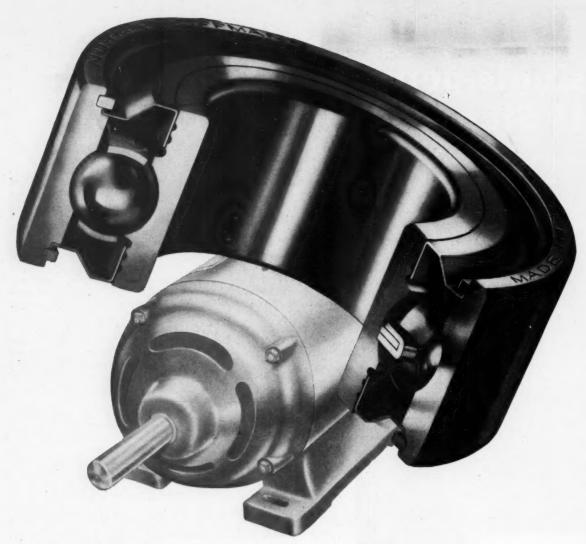
11147 E. 8 Mile Ave., Detroit 32, Michigan

Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, N.Y.

#### NOTE:

## Magnet ideas to speed up general shopwork

See how Carboloy Permanent Magnet Sheet-Steel Separators prevent feeding of doubles. How permanent magnets give an extra "hand" in general shop work, including ... magnetic stands, tool-holding devices, sweepers' pick-up tools, magnetic paper grippers on machines, containers for small parts and magnetic retrievers. (Write for Carboloy Magnet Ideas Kit, PM-102.)



Survey by Leading Motor Manufacturer Proves

## NORMA-HOFFMANN Prolubricated "CARTRIDGE" BEARINGS



A recent survey of over 131,626 A-C motors shows the use of 'Cartridge' Prelubricated bearings saved a yearly average cost of \$270.00 per hundred motors by eliminating periodic relubrication.

In addition to this \$270.00 saving, motors using "Cartridge" bearings showed an indicated saving of \$480.00 by reducing motor outage, lost machine time and man-hours.

A total yearly saving of \$750.00 per hundred motors! You, as a manufacturer of motors, machine tools, pumps or other machinery can pass these savings to your customers by using Norma-Hoffmann "Cartridge" Ball Bearings. How — because these patented bearings require no periodic relubrication.

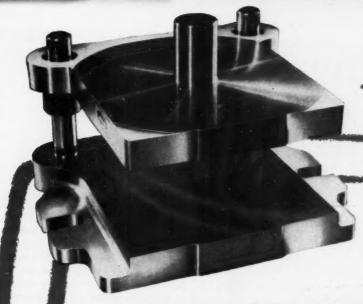
Made to double-row width, Norma-Hoffmann "Cartridge" single-row ball bearings have 100% more grease capacity than conventional width sealed bearings. The highly efficient seals keep dirt out, grease in. Factory-packed with Norma-Hoffmann's specially compounded "stability-tested" grease . . . grease that is highly resistant to oxidation and breakdown . . . assures dependable operation for long periods without regreasing.

without regreasing.

Use Norma-Hoffmann "Cartridge" Ball Bearings in your products. Our engineers are always available for consultation on your bearing applications. Write for their services.

## Precision BEARINGS BALL . ROLLER . THRUST

NORMA-HOFFMANN BEARINGS CORPORATION - STAMFORD, CONN. FIELD OFFICES: Atlanta, Birmingham, Charlotte, Chicago, Cincinnati, Claveland, Dallas, Detroit, Jacksonville, Kansas City, Los Angeles, San Francisco, Seattle



## DANLY DIE SETS

## helped FORD retool for 52

Somewhere behind the scenes in almost every outstanding mass production operation, you'll find Danly Die Sets at work . . . saving time in the die shop and assuring longer production runs in the press room. Danly Die Sets are the first choice of diemakers everywhere.

#### DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue . Chicago 50, Illinois



Get your DANLY DIE SETS from your conveniently located
DANLY BRANCH ASSEMBLY PLANT

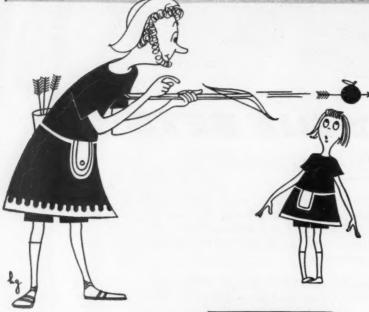
\*CHICAGO 50\_ \_2100 South Laramie Avenue \_1550 East 33rd Street \*DAYTON 7. 3196 Delphos Avenue \*DETROIT 16. \_1549 Temple Avenue \*GRAND RAPIDS \_113 Michigan Street N.W. \_\_5 West 10th Street INDIANAPOLIS 4\_ \_47-28 37th Street \*LONG ISLAND CITY 1... \*LOS ANGELES 54 Ducommun Metals & Supply Co. 4890 South Alameda MILWAUKEE 2\_\_\_\_111 East Wisconsin Avenue \*PHILADELPHIA 40\_ \_\_\_\_511 W. Courtland Street \_\_16 Commercial Street

\*Indicates complete stock



DIE SETS AND DIEMAKERS' SUPPLIES

# heres ACCURACY







Whether you measure grinding accuracy by Profilometer readings or comparison with master samples of ground surfaces, it's yours with Simonds Abrasive Company wheels. Why? Because Simonds wheels are accurately specified in correct grade and grains for your specific operations...accurately tested under conditions of actual use... and manufactured under complete Simonds control from crude abrasive to finished wheels.

Write for free Data Book describing Simonds Abrasive grinding wheels, mounted wheels and points, segments and abrasive grains. Also request name of your nearest Simonds Abrasive distributor.

SIMONDS ABRASIVE COMPANY PHILADELPHIA 37 PA DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitshburg, Mass. Other Simonds Companies: Simonds Steel Mills, Leakport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrazive Co., Ltd., Arvida, Que.

#### 296-MACHINERY, October, 1952

## Grinding Wheel Leads Way To Better Living

"When I was a boy," said the Old Philosopher, "and was sent to the store for a pound of soap, all I had to remember was whether it was soap or castile soap. It was hacked off a long bar and wrapped in a twist of brown paper and the grocer put my nickel in his pants pocket. It didn't smell like violets, it smelled like soap.

"The soap factory was on the edge of town between the slaughter house and the town dump and it was hard to tell them apart. The market was whatever area a good horse could cover in a day. Nowadays a soap factory covers five acres, all glass and chromium. The cakes are pastel tinted, double wrapped, with a name as cute as a Pullman car and smelling like a young buck coming out of a barber shop. You can buy them in Pittsburgh, Pa., Tired Horse, Montana, or Goosewallow, Michigan.

"Multiply this instance by ten thousand and you have the revolution which established the American way of life in the span of one man's lifetime. It required great sales volume which was achieved by national advertising in magazines of national circulation, these last two growing up together, staggering along clinging to each other like a couple of alcoholics. They survived because they had as target a huge population, literate, of one racial stock, one language, and similar tastes, actual or potential.

"Advertising called for brand names and uniform packaging. Volume, packaging, and the need of making savings to pay for advertising led direct to automatic machinery. Automatic machinery demands mass production methods, which call for interchangeability, which means metriculous accuracy and superlative finish, and now we're right back at the grinding wheel. Amazing how many good things of life trace right back to that wheel."



manufactures and stocks a complete line of STANDARD TOOLING and COLLETS for use with Cleveland Automatics. Prompt deliveries. Write for complete information.



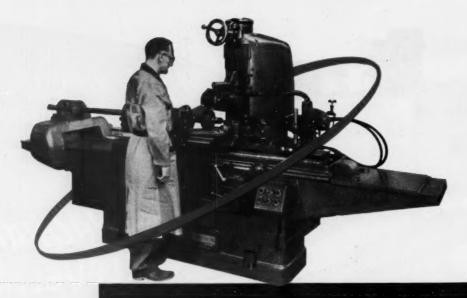
Remember, Clevelands Cut Costs

THE CLEVELAND AUTOMATIC MACHINE COMPANY

DIE CASTING INSERT

4953 Beech Street Cincinnati 12, Ohio SALES OFFICES: CHICAGO CLEVELAND . DETROIT HARTFORD . S. ORANGE

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines



Indexing mechanism of the Helical Grinder

## NEW HELICAL GEAR AND SPLINE GRINDER

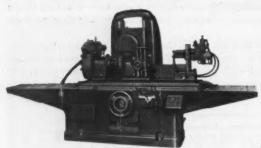
Assures Highest Accuracy in both Lead and Tooth Form



The new Red Ring Helical Gear and Spline Grinder, Models SGF-12" and 18", incorporate the lead bar principle thus eliminating the inherent errors, human and mechanical, of conventional methods heretofore used to maintain specific lead or helix angle.

The lead of every gear tooth or spline is exactly alike—exactly the same as that of the precision ground master lead bar which rigidly controls the progressive rotation of the work part as it is traversed under the grinding wheel.

The grinding wheel is dressed to any desired tooth form. That form is controlled by a hardened steel master form plate which guides the movement of the dresser diamonds.



Red Ring Spur Gear and Spline Grinder, Models SGD-12" and SGC-18"

Write for descriptive folder on Red Ring Gear and Spline Grinders both helical and spur.



#### NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . . . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



#### HIGHLIGHT of drill chuck history

The tightest, truest tool-holding grip ever devised is at your service in the Jacobs Ball Bearing Super Chuck. Its precision ball bearing construction, assuring tremendous strength and friction-free operation, combine to give you the world's finest drill chuck. No wonder it's the overwhelming choice for heavy duty drilling.

Jacobs Chucks are stocked and sold by your Industrial Supply Distributor.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.



Another World Leader. The same special steel alloys, rugged construction and precision craftsmanship combine to make the Jacobs Plain Bearing Chuck unequalled for light and medium duty drilling. It is the world's most widely used chuck.

JACOBS



DESIGNED for good performance under reasonable limits of life expectancy, load capacity and cost requirements, the Rollway TRU-ROL is actually a better buy for normal, non-critical applications. It is especially important where cost is a determining factor.

That doesn't mean it is a "bargain" bearing. It isn't. Its low cost reflects: 1—ingenious steel-cage instead of bronze-separator construction; 2—years of know-how in cost-cutting methods; and 3—mass pro-

duction by modern, high-speed, high-precision machinery and metallurgical facilities.

Outlasts Ordinary Low-Cost Bearings—The ingenious steel-cage of the TRU-ROL insures constant roller alignment and longer-than-usual life. It prevents skew, slide, end-rub and consequent powerloss and early-failure hazards. A side result is a thin, evenly spread lubrication film, hence cooler operation and lower running torque.

Let our engineers help you to select the Rollway bearing that is exactly right for your application. Our years of specialized bearing experience and complete engineering and metallurgical service are always at your command. No cost. No obligation.

Nationwide Replacement Service: Rollway bearings are available for replacement through authorized bearing distributors in principal cities. To locate, consult classified phone directories under BEARINGS. Rollway Bearing Co., Inc., Syracuse 4, N. Y.

## ROLLWAY BEARINGS

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

SALES OFFICES: Boston • Chicago • Cleveland • Detroit • Houston • Los Angeles • Philadelphia • Pittsburgh • Syracuse

60 tractor crankshafts per hour with

Avey
12 STATION LINE-O-DEX



12 Station Transfer Machine—Hydraulically operated indexing mechanism—operations include drilling all angular oil holes plus connecting metering holes. Machine incorporates all Avey-draulic Torque-matic Units for Deep Hole Drilling with Avey Cam Units and Drill Heads for Meter Hole Drilling.

Machine conforms to J.I.C. Standards.

for drilling...tapping...production machines

THE AVEY DRILLING MACHINE CO.

Cincinnati 1, Ohio

## They cancelled their order . . . . and we liked it!

ONE of our good customers ordered a 1500 lb. CECO-DROP, and shortly thereafter cancelled the order.

We don't like cancellations any better than anyone else, but this one we did like . . . after we learned the reason for it: In re-assessing their forge shop requirements, they decided they needed, not one 1500 lb., but two 3000 lb. Ceco-Drops, with an eventual goal of a 100% Ceco-Drop Shop.

The trend is definitely toward Ceco-Drops

Geco-Drops in."

Write for a copy of Bulletin 11-L-O and learn more about this modern hammer.

CHAMBERSBURG ENGINEERING COMPANY
Chambersburg Pennsylvania



## CHAMBERSBURG

THE HAMMER BUILDERS



## Got A Fractional Horsepower Gearing Problem?

ERE at G.S., Small Gearing is a highly developed specialty. We've concentrated on doing this ONE thing better and better, for more than 36 years. There's hardly a Fractional Horsepower Gearing problem we haven't licked during that time. Chances are we can also design and economically mass-produce exactly the Gearing you want, to achieve entirely new, high standards of quality and performance in the products you make.

A lot of big name buyers, as well as smaller but no less particular users, look to us as headquarters for all the Small Gearing they need. You, too, will like the way we keep a promise.. the way we succeed in serving our customers the way they want to be served! See for yourself. Call us in at the drawing-board stage. Get suggestions, ideas and cost estimates. Will you phone or write us today?

Our free 6-page folder illustrates and describes G.S. facilities, Small Gearing and applications, together with handy charts for those who specify Gearing from 12 to 96 D.P. and finer. Will you ask for it on company stationery, please? No obligation, of course.

**SEND FOR IT NOW!** 





WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

# "MARVEL" HAS always had the edge

MARVEL High-Speed-Edge Blades assure Faster, more Accurate cutting with proven Economy and complete Safety. Only the MARVEL is a composite blade with a high-speed-steel cutting edge electrically welded to an exceptionally tough, strong alloy steel body.

The High-Speed-Edge does the cutting while the alloy back, with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin holes (exclusive MARVEL design feature) and cannot be overcome by work resistance. Heavier feeds and greater speeds are practical without "run out."

With greater accuracy, higher production and lower cost per cut, comes the extra dividend of Safety, for MARVEL High-Speed-Edge Hack Saw Blades are Positively Unbreakable—they will not shatter.

Ask your local MARVEL distributor (see classified phone book) to help you modernize your metal sawing with MARVEL High-Speed-Edge Blades. They cost no more than ordinary high-speed-steel blades.

- 1. High-Speed-Steel cutting edge.
- 2. Tough unbreakable alloy steel body with hardened eves.
- 1 & 2. Integrally welded to make a fast-cutting, long lasting composite blade that is positively unbreakable.

## ARMSTRONG-BLUM MFG. COMPANY

"THE HACK SAW PEOPLE"

**5700 BLOOMINGDALE AVENUE** 

**CHICAGO 39, ILLINOIS** 



## FORGING MACHINERY

# KNOWN THROUGHOUT THE WORLD

THE



MANUFACTURING

COMPANY

EUCLID BRANCH P. O.

CHICAGO 3. ILLINOIS

# where power is part of the product, you're right with a DELCO

When you need motors—to serve as a part of your product or to help you make your product—look to Delco for the motors that will serve you best.

Delco produces motors for practically every known purpose . . . and each Delco motor is engineered for the kind of work it has to do. It's made of the finest materials, and constructed to stand up longer under the roughest conditions.

So check on Delco. You'll find Delco motors fit your needs, and that Delco always delivers on time. For complete details, write to Delco Products, Dayton, Ohio, or call the nearest sales office listed below.

## DELCO PRODUCTS

Division of General Motors Corporation

Dayton, Ohio

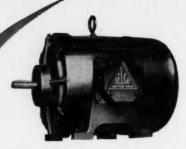
SALES OFFICES:

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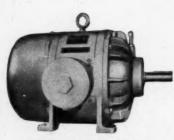
TOTALLY ENCLOSED FAN-COOLED MOTOR



OPEN BALL-BEARING MOTOR



TOTALLY ENCLOSED MOTOR



EXPLOSION-PROOF MOTOR

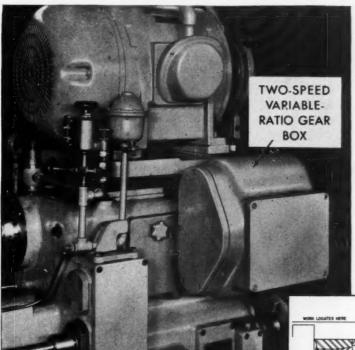
DELCO FEATURES

MAKE

DELCO FINEST

## MACHINE OF THE MONTH

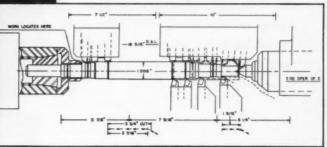
PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YORK



Combined Turning and Squaring
Operations at Different
Cutting Speeds Now Possible
with So-swing Automatically
Controlled Two-Speed
Headstock

Left. View of two-speed, Variable-Ratio Gear Box with Belt Guards removed,

Below. Tooling layout for electric motor shaft.



Problem: To turn, face and undercut shoulders on electric motor shafts, using cemented carbide tools for the turning operations and high speed steel tools for facing, grooving and chamfering operations which require a very smooth finish. Both operations to be made in one handling with automatic spindle speed change between the turning and squaring operations.

Solution: The Model "LR" Automatic Lo-swing Lathe selected for this job was equipped with a Two-Speed, Variable-Ratio, Gear Box shown in the illustration. The speed change from high to low and back to high again in a single machine cycle is controlled by two adjustable cams, mounted on the main cam shaft, which may be set to operate the multiple disc clutch at any time during the machine cycle. The ratio between the high and low speeds may be modified through pick-off gears to suit special conditions without removing or dismantling the gear box.

The tooling layout shows the second of two operations on

a 1½" diameter electric motor shaft. The shaft is held and driven, on a previously turned diameter, in an air-operated collet chuck which grips the shaft well in from the end, exposing only the part to be machined. This method reduces the shaft's effective length and eliminates springing due to the rigid grip of the collet. The work is positively located from a previously finished shoulder, insuring accuracy of shoulder lengths.

The shaft diameters are turned with sintered carbide tools mounted on the front carriage, cutting at a surface speed of 350 ft. per minute. The squaring and forming tools are mounted on the rear slide and operate at a surface speed of 70 ft. per minute, insuring a very high polished surface on the shoulders and formed grooves. This combination assures high production, coupled with smoothly finished shoulders, both of which are very desirable on electric motor shafts.

Consult Seneca Falls engineers for assistance in solving your automatic turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH So-swing

## FRICTION

WORLD'S FASTEST, LOWEST COST METHOD.

DONE BETTER
WITH DOALL
BAND MACHINES
-BUILT FOR THE JOB!

BAND MACHINES — the ideal machines for friction cut-off sawing and friction contour sawing everything from gray iron castings to stainless sheet. Speed range up to 15,000 blade feet per minute. Single or variable speed models available with throat capacities from 16" to 60".

BAND MACHINE used for friction sawing stainless steel, Hastelloy "B" and other ferrous alloys at a large research laboratory. This machine has a speed range of 40 to 10,000 blade feet per minute. It can be used not only for friction sawing but also for sawing, slicing, grinding, honing, polishing and filing any known material, It will contour-machine any shape.





BAND MACHINE



SAW BANDS



GAGING EQUIPMENT



SURFACE GRINDERS

## SAMULIG OF CUTTING FERROUS METALS

DONE BETTER
WITH DOALL
FRICTION SAW BANDS...
DESIGNED EXCLUSIVELY
FOR THE JOB!

Actual size
1/2" wide, 10 pitch friction saw band

DoALL friction saw bands are manufactured in  $\frac{1}{2}$ " and  $\frac{3}{4}$ " widths .032 gage and 1" .035 gage, 10 and 14 pitch. They are sold in 500 ft. coils in exclusive "strip-out" containers or in cut and welded lengths for use on all high speed band sawing machines at speeds from 3000 to 15,000 blade feet per minute.



FRICTION SAWING is a process wherein the friction created by the 3000 to 15,000 feet per minute band speeds softens the metal being cut, by heating it to its forging temperature directly ahead of the band teeth. The teeth bite easily into this softened metal, hogging it out much faster than if the metal were cold.

Friction Sawing provides amazingly fast cutting of ferrous metals, including hard-to-machine alloys. Sheet steel 1/16" thick can be cut at 140 linear feet per minute. One-inch material can be cut at speeds up to six lineal inches per minute.

The speed and economy of friction sawing is greatly dependent upon the saw band used. The tooth design, pitch, set, band width, thickness, steel alloy and heat treating of DoALL Friction Saw Bands are all specially designed for the job. A unique hardening technique is used to give longer set life and increase tooth strength. The metallurgical characteristics of the band are peaked for maximum flex life.

Here are the benefits of DoALL Friction Saw Band de-

sign, as compared to any standard or substitute metal cutting band:

- 1. Faster cutting rate.
- 2. Less operator fatigue.
- 3. Less burr.
- Less heat penetration (excessive heat destroys desirable alloy characteristics).
- 5. Longer blade life on straight and radius cutting.
- 6. Less downtime for blade replacement.
- 7. Lower labor costs.
- 8. Lower production costs.

Tests have proved conclusively that when all factors, particularly labor costs, are taken into consideration, the cost of friction sawing with DoALL Friction Saw Bands is as much as 15 times lower than with bands not designed for the purpose.

For the fastest, lowest cost cutting of ferrous metals, use friction band sawing with DoALL machines and saw hands.

Call DoALL today—ask for free literature and a demonstration of friction sawing at your own plant.



THE DOALL COMPANY

254 N. Laurel Avenue, Des Plaines, Illinois

In Canada: The DoALL Company of Canada, Ltd. 37 Clarkson Avenue, Toronto 10, Ontario, Canada

FOR COMPLETE INFORMATION refer to the DoALL Bend Tool Manuel—a 160-page guidebook to better hand machining of all materials. Price \$2.00 at your local DoALL Store.



38 Local Sales-Service Stores

See DoALL equipment at the National Metal Exposition, Philadelphia, October 18-24, Booth 524 and 623.

#### RIV - OFFICINE DI VILLAR PEROSA S. p. A. TURIN (ITALY)

ESTABLISHED IN 1906: climost 30 years of stoody development are a guaranty of wide engineering experience.

3 FACTORIES: at Turin, Wiler Person, Apromio, covering elogother on area of 200'000 square motors, constitute on industrial group of high productive possibilities.

100 ENGINEERS: place their technical financiadge and practical experience at the service of overy customer.

1500 OFFICE WORKERS : make up on efficient commercial and administrative organization.

9000 WORKMEN: contribute their labor and skill to an ever improving and increasing production.

8000 MACHINE TOOLS: mean on industrial capacity of world imperance.

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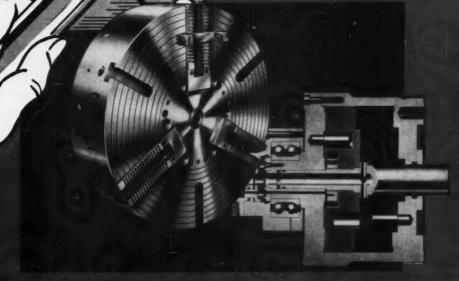
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## UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, with proper grinding wheels, can and do give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 highspeed cam plates were ground on both sides in 134 hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results-90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of  $\pm .0002$ , and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders - let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.

PLEASE CONSULT THE ENGINEERS WHO DESIGNED ME, AND LET THEM SPECIFY THE CORRECT BLANCHARD WHEELS. SO THAT I CAN WORK FOR YOU BETTER, FASTER, AND CHEAPER D FLA MAZ HOLL TOO F CU 1APER

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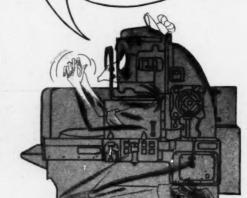
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Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding."Write for free copies today!





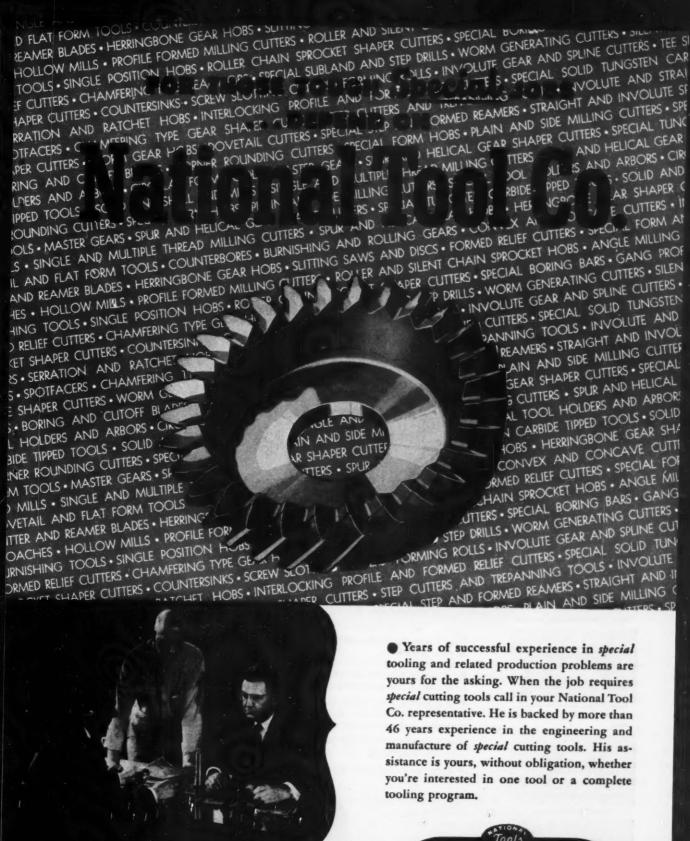


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THE BLANCHARD MACHINE COMPANY

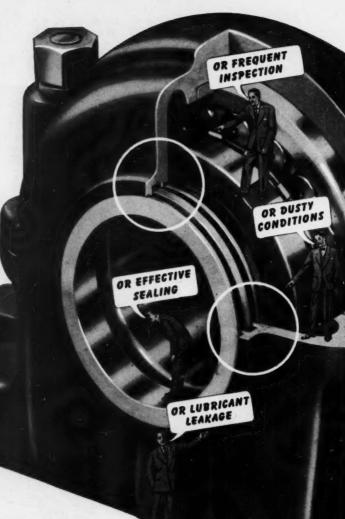
312-MACHINERY, October, 1952

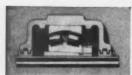


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"Free" Spherical Reller Bearing.



Same Pillow Block as above, Bearing "Held" by stabilizing ring.



"Free" Ball Bearing



Same Pillow Block as above, Bearing "Held" by stabilizing ring.

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## SKF TRIPLE-SEAL "SAF" PILLOW BLOCKS

Here's why the Series SAF Pillow Block is **SKF**'s answer to your problems:

- Triple-Seal rotating rings give positive protection in dirty locations; effectively seal out foreign matter; seal in oil or grease.
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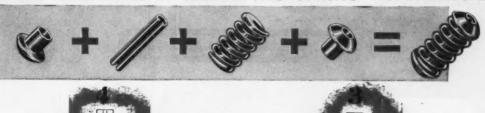
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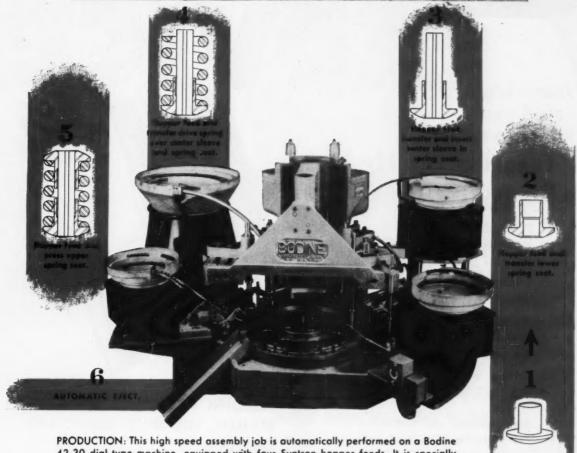
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## SELLERS NO. 1-G DRILL GRINDER WITH BALL BEARING SLIDE

This small, self-contained, bench-type grinder embodies the sound features that have conclusively demonstrated their superiority in the larger Sellers Drill Grinders. Foremost among which are the basic principles and inherent accuracy of the Sellers Chuck and the Sellers advanced method of drill grinding. This grinder produces the Sellers point on a single drill or an exact duplication on as many drills as are required. It grinds right hand 2 lip twist drills from .028" (No. 70) up to ½" diameter to any included angle of point from 80° to 160°. Designed with ball bearing slide, ball bearing swing frame and quick-adjusting tail center which combined provide increased accuracy, reduced wear and further simplification of operation and adjustment. Sellers Drill Grinders are built to last. Part replacements are negligible, however, if required, replacement parts are always available. Complete information will be furnished upon request.

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- AO worker-lab tests show much greater field of vision and increased comfort
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"326" Chippers' Coverglas goggle supplied with regular Super Armorplate lenses. "327" Welders' Coverglas goggle supplied with regular Noviweld lenses and cover lenses.

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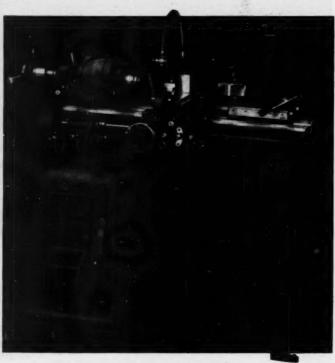


## SOUTH BEND

## 1000 TURRET LATHE

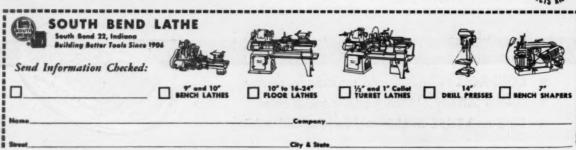
### Cost-Cutting Versatility

This precision turret lathe will cut your machining costs on small parts. Built-in accuracy, ease of operation and a wide range of speeds and feeds insure high production and close tolerances. Practical attachments simplify tooling the lathe for jobs which might otherwise require special fixtures. What's more, your least experienced operator will soon be a top producer on the 1000 Turret Lathe—it's that easy to run. Find out how this versatile turret lathe can improve your machining—send coupon now.



#### SPECIFICATIONS

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Collet Capacity 1"	Power Cross Feeds
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Spindle Speeds 12	48 .
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DETACHABLE
EVEN AFTER THE
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CUTS

Above. Counterbering a hale in a cast from making base. Unformity of chips indicates proccutting action; chip disposal is aided by wide flutes. And when the operation is finished the cutter. CONTINENTAL DRIVE STANDARD DRIVE COUNTERBORES

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positive drive that practically is indestructible. Double bearing areas in the drive assure rigidity and proper alignment of cutters and holders. Continental Counterbores are available individually or in sets that include holders, cutters, countersinks and pilots in practical size ranges.

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Continental Counterbore Sets, available in your choice of three sizes, are fully described in Bulletin D27161. Send for your copy.

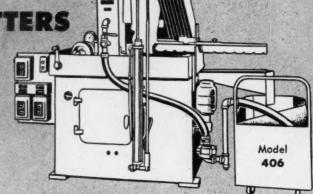


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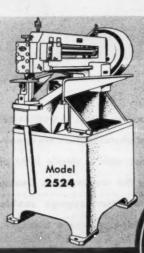
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Nibblers

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To find headings easily, look for capital letters at top of each page to denote locations

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Carborundum Co., Buffalo Ave., Niagara Falls, N. Y. Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

#### ABRASIVE DISCS

See Discs, Abrasive.

#### ABRASIVES, Polishing, Tumbling, Etc.

Carborundum Co., Buffalo Ave., Niagara Falls, N. Y. DoAll Co., 254 Laurel Ave., Des Plaines, Ill. Norton Co., I New Bond St., Worcester 6, Mass. Simonds Abrasive Co., Tacony and Fraiey Sts.. Bridesburg, Philadelphia, Pa.

#### **ACCUMULATORS, Hydraulic**

ACCUMULATORS, Hydraulic

American Steel Foundries, Elmes Engineering
Div., Paddack Rd. and Tennessee Ave.,
Cincinnati, Ohio
Baldwin-Lima-Homilton Corp., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Farquhar, A. B., Co., 21 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 25 Main St.,
Ansonia, Conn.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo,
N. Y.
Morgan Engineering Co., Alliance, Ohio. Margan Engineering Co., Alliance, Ohio. Watson-Stillman Co., Roselie, N. J.

#### AIR HOISTS-See Hoists, Air.

AIR TOOLS—See Grinders, Pneumatic; Drills, Portable Pneumatic, Etc.

ALLOY-STEELS

Allegheny Ludium Steel Corp., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa. Carpenter Steel Co., Reading, Pa. Carpenter Steel Co., Reading, Pa. Crucible Steel Co. of America, Chrysler Bidg., New York, N. Y. Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y. Republic Steel Corp., Union Drawn Steel Div., Republic Steel Corp., Union Drawn Steel Div., Republic Bidg., Cleveland, Ohio. Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
U. S. Steel Corp., Carnegie-Illinois Steel Corp. Div., 436 7th Ave., Pittsburgh, Pa. Wheelack, Lovejoy & Co., Inc., Cambridge, Mass.

#### **ALLOYS, Aluminum**

Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa.

#### **ALLOYS**, Magnesium

Dow Chemical Co., Midland, Mich.

#### **ALLOYS, Non-Ferrous**

American Brass Co., 25 Broadway, New York.
Chase Brass & Copper Co., Inc., 1949 Rodney
St., Waterbury 29, Conn.
Haynes Stellite Div., Union Carbide & Carbon
Corp., 30 E. 42nd St., New York, N. Y.
Revere Copper & Brass Inc., 230 Park Ave.,
New York, N. Y.

#### ARBOR PRESSES

See Presses, Arbor.

#### ARBORS AND MANDRELS

ARBORS AND MANDRELS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., 1242 E. 49th St.,
Cleveland, Ohio.
Danly Machine Specialties, Inc., 2107 S. 52nd
Ave., Chicago 50, Ill.
Erickson Tools Div. Erickson Steel Co., 2309
Hamilton, Cleveland, Ohio.
Gorham Tool Ce., 14400 Woodrow Wilson, Detroit, Mich.
Gorton, George, Mch. Ce., 1110 W. 13th St.,
Racline, Wis.
Jacobs Mfg. Co., West Hartford, Conn.
Kempsmith Machine Co., 1819 S. 71st St.,
Milwaukee 14. Wis.
Keo Cutters, 19326 Woodward, Detroit, Mich.

Morse Twist Drill & Mch. Co., New Bedford, Mass.

Mass. National Tool Co., 11200 Madison Ave., Cleve-land, Ohio. National Twist Drill & Tool Co., Rochester,

Mich.
Pratt & Whitney, West Hartford 1, Conn.
Union Twist Drill Co., Athol, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.

Bunting Brass & Bronze Co., Spencer & Cariton Aves., Toledo, Ohio. Johnson Bronze Co., New Castle, Pa.

Ryerson, Jos. T., & Son, 2558 W. 16th St., Chicago 18, III.

#### BALANCING EQUIPMENT

BALANCING EQUIPMENT
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Rockford, III.
Gisholt Machine Co. (Static and Dynamic), 1245
E. Washington Ave., Madison 10, Wis.
Morris Machine Tool Co., 9 Harriet St., Circinnati 3, Ohio.
Orban, Kurt, Co., 205 E. 42nd St., New York
17, N. Y.
Pope Machinery Carp., Haverhill, Mass.

(Continued on page 326)





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Allis-Chalmers engineers wanted something special in machine tools. They wanted a 30-foot boring mill with "advanced control and speed range concepts which would anticipate the future . . . remain modern for decades."

Today, that Niles-built boring mill is hard at work in Milwaukee. A success? . . . just read what Allis-Chalmers has to say:

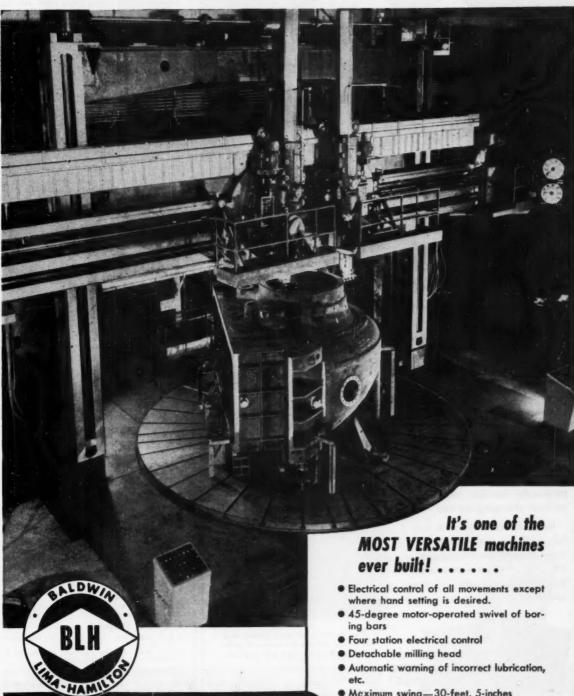
"Niles Tool Works translated Allis-Chalmers' desires into a machine which has fully met its high expectations.

In spite of the machine's vastly more complicated design, it is felt that its ruggedness and reliability will equal that of the 40-foot mill built by Niles in 1928, which has been in continuous operation at Allis-Chalmers for 23 years."

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In the Niles standard line there are vertical boring mills to 43-feet, side-head mills to 54-inches, 6-inch horizontal mills, planers to 15-feet, lathes to 120-inches. Each is a brute force machine with a precision touch.





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- Maximum swing—30-feet, 5-inches
- Max, height under tool—17-feet
- Bar travel—10-feet

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This NEW development—unsurpassed for speed, convenience of tooling and precise finish-involves no retooling problem even for short runs. It assures greater production at lower cost on all classes of work.

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Here's an ideal machine tool for small lot requirements because of quick, easy changeover. Any class of chuck work can be handled economically in any quantity.





The examples of work shown here are typical of the wider variety of parts being produced on these new machines.

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detailed information on this new machine. Let us have samples of your work in order to give you time and cost estimates for handling if an the "1-2-3" Goss & De Lesuw.

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#### **BARS, Phosphor Bronze**

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Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bidg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport. Pa. Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
LoSalle Steel Co., Hammond, Ind.
Orban, Kurt, Co., 205 E. 42nd St., New York 17, N.Y.
Republic Steel Corp., Union Drawn Steel Div., (Cold drawn), Republic Bidg., Cleveland, Ohio.
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.
Solar Steel Corp., Union Commerce Bidg., Cleveland, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
U. S. Steel Corp. (American Steel & Wire Ce.
Div., Carnegle-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Po.

Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge,
Mass.

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BEARINGS, Ball

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Ball & Roller Bearing Co., Danbury, Conn.

Boston Gear Works, 3200 Main St., North
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C & C Sales Corp., 1771 Broadway, New York
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Fafnir Bearing Co., New Britain, Conn.

Mariin-Rockwell Corp., 402 Chandler Bldg.,
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S K F Industries, Inc., P. O. Box 6731, North
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Orange Roller Bearing Co., Inc., Orange, N. J.
Standard Pressed Steel Co., Jenkintown, Pa.

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#### BEARINGS, Roller

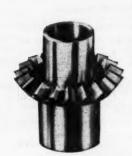
Aetna Ball & Roller Bearing Co., 4612 Schubert Ave., Chicago, III. Ball & Roller Bearing Co., Danbury, Conn. C & C Soles Corp., 1771 Broadway, New York 19, N. Y. Fafnir Bearing Co., New Britain, Conn. Hyaft Bearings Div., Harrison, N. J. Marlin-Rockwell Corp., 402 Chandler Bldg., Jamestown, N. Y. Norma-Hoffmann Bearings Corp., Stamford, Conn. Orange Roller Bearing Co., Inc., Orange, N. J. Conn.
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Rollway Bearings Co., Inc., 541 Seymour St.,
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(Continued on page 328)





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BEARINGS, Thrust
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Ball & Roller Bearing Co., Danbury, Conn.
Boston Gear Works, 3200 Main St., North
Quincy, Mass.
Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.
Faffair Bearing Co., New Britain, Conn.
General Electric Co., Schenectady, N. Y.
Marilin-Rockwell Corp., 402 Chandler Bidg.,
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Norma-Hoffmann Bearings Corp., Stamford,
Conn.
Orange Roller Bearing Co., Inc., Orange, N. J.
Shafer Bearing Corp., Downers Grove, III.
Timken Roller Bearing Co., Canton, Ohio.
Torrington Co., Torrington, Conn.

BELT FASTENERS, Metal, Leather, Etc. Bristol Co., Platts Mills, Waterbury, Conn.

#### BELT SHIFTERS

Standard Pressed Steel Co., Jenkintown, Pa.

#### BELTING TRANSMISSION

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.

BENCHES, Work, and Bench Legs Standard Pressed Steel Co., Jenkintown, Pa.

#### BENDING MACHINES, Angle Iron, Plate, Etc.

Consolidated Mch. Tool Corp., \$65 Blossom Rd., Rochester, N. Y. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III.

III.
Kling Bros. Engineering Works, 1320 No.
Kostner Ave., Chicago 51, III.
O'Neill-Irwin Mtg. Co., Lake City, Minn.
Struthers Wells Corp., Machinery Div., Titusville, Pa.

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Pa.

Bethlehem Steel Co., Bethlehem, Pa.

Buffalo Forge Co., 490 Broadway, Buffalo, N.Y.

Chambersburg Engrg. Co., Chambersburg, Pa.

Farquhar, A. B., & Co., 21 Duke St., York, Pa.

Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III.

Hit.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mf. Gilead, Ohio.
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo,
N. Y.
Morgan Engineering Co., Alliance, Ohio.
Niagara Machine & Tool Works, 683 Northland
Ave., Buffalo, N. Y.
O'Neill-Irwin Mfg. Co., Lake City, Minn.
Struthers Wells Corp., Machinery Div.,
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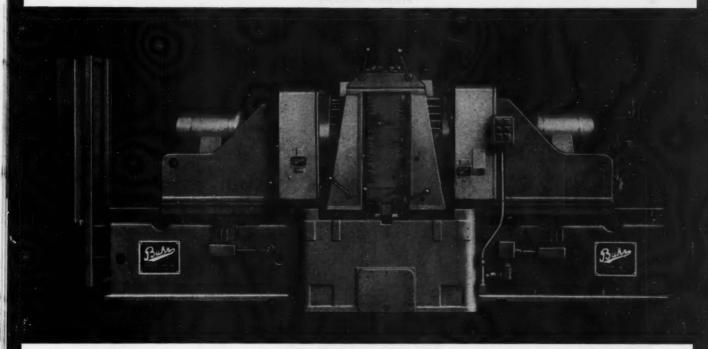
Leiman Bros., Inc., 156 Christie St., Newark, N. J. N. J. Pangborn Corp., Hagerstown, Md. Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

#### BLOWERS

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J. Leiman Bros., Inc., 156 Christie St., Newark,

(Continued on page 330)

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which is now hard at work day-in and day-out . . . helping one of the world's largest manufacturers turn out automatic transmission cases for tanks . . . This kind of Machine—more than anything else—is what Stalin hates.

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To help stymie Stalin, one of the world's largest engine makers was awarded an enormous defense order. Production had to get under way as quickly as possible!

#### One of Their Problems

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To handle this very important phase of their production, they turned to Buhr.

#### What the Machine Does

In general—it drills, counterdrills and countersinks 41 holes in front end of transmission case . . . and drills, coun-

terdrills and countersinks 52 holes in rear end of case.

Specifically, the Machine accomplishes

#### From the left:

Drills (1) 25/32" diameter hole through Drills and counterdrills (28) #1 holes Drills and counterdrills (8) #2 holes Drills (1) 29/32" diameter hole through Drills (1) ½" diameter hole ¾" deep Drills and countersinks (2) end cover dowels on vertical center.

#### From the right:

Drills and counterdrills (11) #1 holes Drills and counterdrills (8) #2 holes Drills (12) #3 holes through Drills and counterdrills (12) #10 holes Drills and counterdrills (1) #19 hole Drills and counterdrills (8) #6 holes Production: 40 pieces per hour at 100% efficiency.

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U. S. Steel Corp., National Tube Co.

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BOLTS AND NUTS

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Bethlehem Steel Co., Bethlehem, Pa.

Erie Bolt & Nut Co., Erie, Pa.

National Acme Co., 170 E. 131st St., Cleveland, Ohlo.

Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohlo.

Ottemiller, W. H., & Co., York, Pa.

Republic Steel Corp., Bolt & Nut Div., Republic Bldg., Cleveland I, Ohlo.

Russell, Burdsall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y.

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Canedy-Otto Div. Cincinnati Lathe & Tool Co.,
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Consolidated Mch. Tool Corp., Rochester, N. Y.
Ex-Celi-O Corp., 1200 Oakman Blvd., Detroit
32, Mich.
Foote-Burt Co., 1300 St. Clair Ave., Cleveland Foote-Burt Co., 1300 St. Clair Ave., Cleveland 8, Ohio.
Ingersoli Milling Mch. Co., 2442 Douglas St., Rockford, III.
Moline Tool Co., 102 20th St., Moline, III.
Morris Machine Tool Co., 9 Harriet St., Cincinnati 3, Ohio.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
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Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
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Giddings & Lewis Machine Tool Co., Fond du
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Orban, Kurt, Co., 205 E. 42nd St., New York
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Rogers Machine Works, Inc., Buffolo 10, N. Y.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.

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Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Carboloy Dept., General Electric Co., Box 237,
Roosevelt Park Annex, Detroit 32, Mich.
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis..
Erickson Tools Div. Erickson Steel Co., 2309
Hamilton, Cleveland, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III.

(Continued on page 332)

## Aesop's Fable of e and the Crow" carries a moral for **Cutting Fluid users** The Fable . . . A Crow, sitting on a fence post, watched a huge Eagle swoop down on a luckless lamb and carry it away. "That looks easy", thought the Crow, and straightaway tried to duplicate the Eagle's feat. Of course, he couldn't lift the lamb and, instead, got tangled up in its wool and couldn't get loose. The farmer came over, grabbed the Crow, and wrung its foolish neck.

#### The Moral . . .

Just as there was a big difference in abilities of, and results secured by, the Eagle and the Crow in the fable, so are there big differences in the abilities of basically different types of cutting fluids. Stuart Oil Co., recognizing this, does not attempt to apply a watermixed cutting fluid where a straight oil is needed, or vice versa. Some applications require a fluid

with great lubricity, on others high anti-weld properties are necessary. All require temperature regulation, but always more than a "coolant" is needed.

Let your Stuart Representative demonstrate the opportunities for increased machining efficiency in your plant. Ask to have him call at your convenience.

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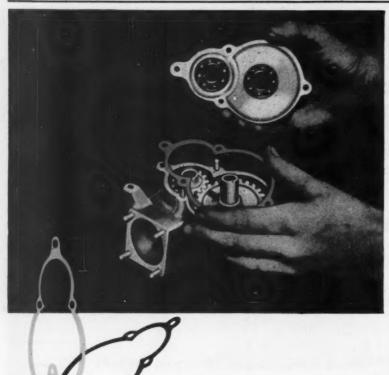
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It gives wide tolerances to the thrust gear housing, saving expensive machining time.

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Warner & Swasey Co., 5701 Carnegie Ave.,
Cleveland 3, Ohio.
Williams, J. H., & Co., 400 Vulcan St., Buffalo
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Gray, G. A., Co., Woodburn Ave. and Penn R. R., Evanston, Cincinnati, Ohio.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.
Lucas Mch. Tool Div., New Britain Mch. Co., 12302 Kirby Ave., Cleveland 8, Ohio.
Orban, Kurt, Co., 205 E. 42nd St., New York 17, N. Y. Wis.

17, N. Y.
Portage Machine Co., 1069 Sweitzer Ave.,
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Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Turner Bros., Inc., 2625 Hilton Rd., Ferndale
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20, Mich.

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Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford. III.

Mummert-Dixon Co., Hanover, Pa.

Neise, Karl A., Dept. M., 381 Fourth Ave., New York 16, N. Y.

Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

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Cleereman Mch. Tool Co., Green Bay, Wis.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

De Vileg Machine Co., 450 Fair Ave., Ferndale, Detroit 20, Mich.
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
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Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.
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(Continued on page 334)



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Foote-Burt Co., 1300 St. Cloir Ave., Cleveland
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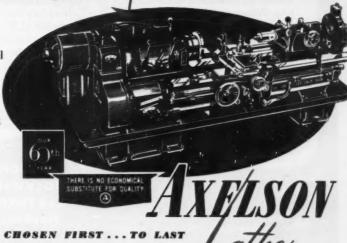
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(Continued on page 336)



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Eisler Engrg. Co., Inc., 760 S. 13th, Newark 3, N. J. Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Kux Mch. Co., 3930 W. Harrison St., Chicago, Rowbottom Machine Co., Sheffield St., Water-ville, Waterbury, Conn. Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

#### CARBIDES, TANTALUM TITANIUM AND TUNGSTEN

Adamas Carbide Corp., 999 South 4th St.. Harrison, N. J. Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. (Continued on page 338)

## Practical Assistance



Whether it's burrs in a dog's coat, or cutting oil snarls on your production line... there's no substitute for practical assistance when the going really gets tough.

#### And **PRACTICAL TECHNICAL ASSISTANCE** is a Cities Service specialty.

Cities Service Lubrication Engineers can offer every machining operation practical assistance that will mean dollars, man-hours and equipment saved. These specialists recommend the most effective lubricating practices, and they offer the most complete line of quality cutting fluids.

#### BUT CHECK FOR YOURSELF:

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Check the complete Cities Service line.
It is the ideal, single source for the correct cutting fluid for every need. Deliveries are quick, accurate and dependable.

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#### CASTINGS, Die

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Bethlehem Steel Co., Bethlehem, Pa. Brown & Sharpe Mfg. Co., Providence, R. I. Chambersburg Engineering Co., Chambersburg,

#### CASTINGS, Steel, Alleys, Etc.

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Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.

U. S. Steel Corp., Columbia Steel Co., Div., 436 7th Ave., Pittsburgh, Pa.

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Besly-Welles Corp., Beloit, Wis. Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

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Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.
Houston Grinding & Mfg. Co., 2110 Quitman St., Houston 10, Tex.
Kennametal, Inc., Lafrobe, Pa.
Metal Carbides Corp., Youngstown, Ohio.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio. land, Ohio. Jand, Ohio. Juper Tool Co., 21650 Hoover Rd., Detroit 13, Super Tool Co., 21000 1...
Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.

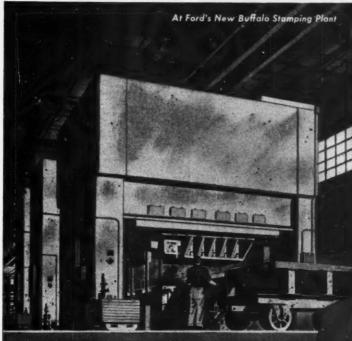
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Boston Gear Works, 3200 Main St., North Quincy, Mass. Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio. Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa.

#### CHISELS AND CHISEL BLANKS

Bethlehem Steel Co., Bethlehem, Pa. Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.

(Continued on page 340)



### RELIANCE Adjustable-speed

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**MOTORS** 

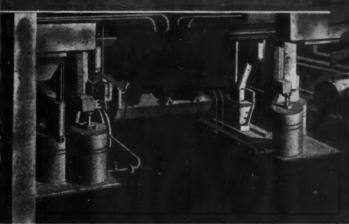
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## on Triple-Action Presses

Adjustable speeds by the Reliance V\*S System have answered the challenge of establishing and maintaining record

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Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.
Goss & DeLeeuw Mch. Co. (Multiple Spindle), Kensington, Conn.
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.
National Acme Co. (Multiple Spindle), 170 E.
131st St., Cleveland, Ohio.
Potter & Johnston Co., 1027 Newport Ave., Paytucket, R. 1.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

#### **CHUCKS**, Air Operated

Cushman Chuck Co., Windsor Ave., Hartford 2, Conn.
Gisholt Machine Co., Windsor Ave., Hartford 2,
Conn.
Gisholt Machine Co., 1245 E. Washington Ave.,
Madison 10, Wis.
Hufford Machine Works, Inc., 1700 E. Grand
Ave., El Segundo, Calif.
Logansport Machine Co., Inc., Logansport, Ind.
Mead Specialties Co., 4114 North Knox Ave.,
Chicago 41, Ill.
Schrader's Son, A., 470 Vanderbilt Avenue,
Brooklyn, N. Y.
Skinner Chuck Co., 344 Church St., New
Britain, Conn.
Tomkirs-Johnson Co., Jackson, Mich.
Zagor Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohlo.

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Ettco Tool Co., Inc., 592 Johnson Ave., Brioklyn, N. Y.
Hirschmann, Carl, Co., 30 Park Ave., Manhaset, N. Y.
Jacobs Mg. Co., West Hartford, Conn.
Orban, Kurt, Co., 205 E. 42nd St., New York
17, N. Y.
Skinner Chuck Co., 344 Church St., New
Britain, Conn.
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#### CHUCKS, Lathes, Etc.

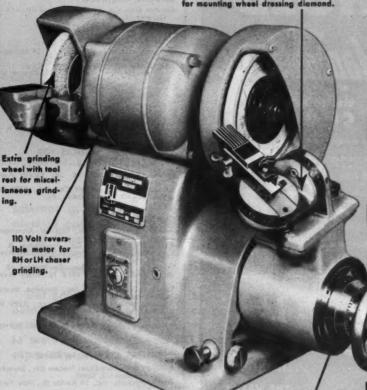
Buck Tool Co., 220 Schippers La., Kalamazoo, Buck Tool Co., 220 Schippers La., Kalamazoo, Mich.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Cushman Chuck Co., Windsor Ave., Hartford 2, Conn.
Erickson Tools Div., Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio.
Gisholt Mch. Co., Madison 10, Wis.
Jacots Mg. Co., West Hartford, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.
(Continued on page 342)

(Continued on page 342)

## JONES & LAMSON UNIVERSAL BENCH TYPE CHASER SHARPENING MACHINE

Specifically designed to resharpen chasers, this Low Cost, space saving machine allows you to free heavy expensive machine tools for their intended uses, and at the same time do a better job of chaser sharpening. It's good for miscellaneous small tool and cutter grinding too.

J&L Universal Grinding Fixture with tangent chaser. Basic fixture has provision for mounting wheel dressing diamond.



Graduated micrometer dial to control infeed.

Grinder set up to resharpen J&L Tangent chasers

Universal Application Equipped with the new J&L chaser grinding fixture and adapters, an outstanding job will be done on all

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minutes, learn to resharpen chasers on this machine.

SPACE 14 x 28 inches is ample for your complete chaser resharpening operation.

This complete unit, designed to do your entire chaser resharpening job, sells for only a small fraction of the cost of other bulkier machines often used. Why not install one in your plant, and release your heavier, bulkier machines for their intended uses?

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Errington Mechanical Laboratory, 24 Norwood
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Jarvis, Charles L., Co., Middletown, Conn.
National Tool Co., 11200 Modison Ave., Cleveland, Ohio.
Neise, Karl A., Dept. M., 381 Fourth Ave.,
New York 16, N. Y.
Procunier Safety Chuck Co., 18 S. Clinton St.,
Chicago, Ill.

#### **CHUCKS, Ring Wheel**

Gardner Mch. Co., Div. Landis Tool Co., 414 E. Gardner St., Beloit, Wis.

#### **CHUCKS, Tapping**

Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y. Jacobs Mfg. Co., West Hartford, Conn. Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill. Skinner Chuck Co., 344 Church St., New Britain, Conn.

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DoAll Co., 254 Laurel Ave., Des Plaines, III.
Mead Specialties Co., 4114 N. Knox Ave.,
Chicago 41, III.
Rivett Lathe & Grinder, Inc., Brighton, Boston
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Standard Shop Equipment Co., Inc., 8299 W.
Tinicum Ave., Philadelphia, Pa.
Starrett, The L. S., Co., Athal, Mass.
Williams, J. H., & Co., 400 Vulcan St., Buffolo
7, N. Y.

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Clearing Mch. Corp., 6499 W. 65th St., Chicago
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Farrel-Birmingham Co., Inc., Ansonia, Conn.
Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y.
Morris Machine Tool Co., 9 Harriet St., Cincinnati 3, Ohio.
Rockford Clutch Div., Borg-Warner Corp., 410
Catherine St., Rockford, III.
Twin Disc Clutch Co., 1361 Racine St., Racine,
Wis.
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Brown & Sharpe Mfg. Co., Providence, R. I. Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio. Erickson Tools Div. Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio.

(Continued on page 344)

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Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.

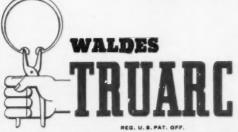
Groove Double groow located from top of hole top of hele



Double groove Groove located located from from bottom top of hele of hele

The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

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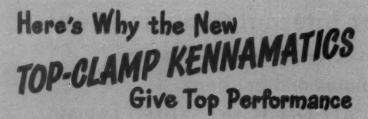
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simply loosen clamping screw and clamp is up and away from insert.

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most types can be used on insert without interference with clamp.

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provides added clearance and eliminates shank abrasion from chip wash.

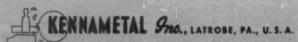


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design provides greater rigidity. Insert is solidly backed up in direction of cutting force.

#### **ALL Proved KENNAMATIC Features Retained!**

- Indexable insert—positioned vertically—makes best use of Kennametal's high compressive strength.
- Simplified tool setting—insert has several cutting edges on both ends; can be revolved, turned end over end, or replaced without changing tool setting.
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Sinclair Refining Co., 630 5th Ave., New York.
Standard Oil Co. (Indiana), 910 S. Michigan,
Chicago, III.
Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St.,
Chicago 23, III.
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Tide Water Associated Oil Co., 17 Battery
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Eisler Engrg. Cc., Inc., 760 S. 13th, Newark 3, N. J.
Fellows Gear Shaper Co., Springfield, Vt.
Gorham Tool Co., 14400 Wnodrow Wilson, Detroit, Mich.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Hill Acme Co., 1201 W. 65th St., Cleveland, O. Maryland Precision Instrument Co., 12 E. Lanvale St., Baltimore 2, Md.
Minster Machine Co., Minster, Ohio.
Morse Twist Drill & Mch. Co., New Bedford, Mass. Mummert-Dixon Co., Hanover, Pa. National Acme Co., 170 E. 131st St., Cleveland, Ohio.
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(Continued on page 346)



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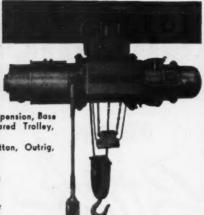


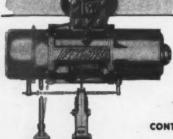
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Cleveland Twist Drill Co., 1242 E. 49th St.,
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Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
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Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon
Corp., 30 E. 42nd St., New York.
Kennametal, Inc., Latrobe, Pa.
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.
National Twist Drill & Tool Co., Rochester,
Mich.
Wisitney, Wart Hortford, I. Corp.

National Twist Drill & Tool Co., Rochester, Mich.
Pratt & Whitney, West Hartford 1, Conn.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Starrett, The L. S., Co., Athol, Mass.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.
Union Twist Drill Co., Athol, Mass.
Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

#### COUNTERSHAFTS

Standard Pressed Steel Co., Jenkintown, Pa.

#### COUNTERSINKS

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Tool Co., 14400 V'oodrow Wilson, De-

32, Mich.
Gorham Tool Co., 14400 V'oodrow Wilson, Detroit, Mich.
Greenfield Top & Die Corp., Greenfield, Mass.
Haynes Stellite Div., Union Carbide & Carbon
Corp., 30 E. 42nd St., New York.
Mass. Twist Drill & Mch. Co., New Bedford,
Mass.
National Twist Drill & Tool Co., Rochester,

Mich.
Severance Tool Industries, Inc., 636 lowa Ave.,
Saginaw, Mich.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Super Tool Co., 21650 Hoover Rd., Detroit 13,
Mich.

Super Tool Co., 21000 ... Mich. Union Twist Drill Co., Athol, Mass.

#### **COUNTERS, Revolution**

Bristol Co., Platts Mills, Waterbury, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Millers Falls Co., Greenfield, Mass.
Starrett, The L. S., Co., Athol, Mass.
Veder-Root, Inc., 20 Sargent St., Hartford,

#### COUNTING DEVICES

Starrett, The L. S., Co., Athol, Mass. Veeder-Root, Inc., 20 Sargent St., Hartford,

#### **COUPLINGS**, Flexible

Boston Gear Works, 3200 Main St., North Quincy, Mass. Farrel-Birmingham Co., Inc., 25 Main St., An-sonia, Conn. Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa.

(Continued on page 348)



Quality is the theme at Massey-Harris Company . . . in fact, the production line in their tractor plant at Racine, Wisconsin is known as "Quality Avenue".

An important part of "Quality Avenue" are the H-P-M 400-ton capacity Fastraverse Presses shown above producing parts for the Model 44 Massey-Harris Tractor. The triple action press at

the left forms two grille tops in a single operation; a 28" x 30" blank is drawn 11" deep. The double action press at the right produces fenders from a blank 43" x 36", drawn to a depth of 5". Both presses average 16 hours a day, 5 days a week.

The men at Massey-Harris will tell you of the outstanding performance of their H-P-M presses . . . less than 1% scrap loss . . . evidence that companies genuinely conscious of quality in their own product also look for quality in the products they buy.

Yes, we at H-P-M, too, know quality counts
. . and that you'll get it in every H-P-M Press

... quality workmanship and materials ... backed by H-P-M's 75 years of specialized experience in the field of hydraulics.

Invite us in at the planning stage to discuss your production problem, won't you?



#### THE HYDRAULIC PRESS MFG. COMPANY

1042 MARION ROAD

MOUNT GILEAD, OHIO, U. S. A.

Builders of Presses for the Metal Working & Processing Industries \* Plastics Molding Presses \* Die Casting Machines \* Hydraulic Pumps, Valves & Power Units



designing present models-Twin Disc can probably supply your power linkage needs with job-proved Friction or Hydraulic Drives from the standard Twin Disc line. Why not write today for complete dustry as a highly successful information or design help?

dependable production design. NA Built for a Long Life . . . Backed for a Lifetime

units from the standard

Twin Disc line proved satisfactory. Today, the big Bath

PT Brake is accepted by in-

TWIN DISC CLUTCH COMPANY, Rucine, Wisconsin . HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND . DALLAS . DETROIT . LOS ANGELES . NEWARK . NEW ORLEANS . SEATTLE . TULSA

#### COUPLINGS, Shaft

Boston Gear Works, 3200 Main St., North Quincy, Mass. Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio. Standard Pressed Steel Co., Jenkintown, Pa.

#### CRANES, Electric Traveling

Cleveland Crane & Engrg. Co., Wickliffe, Ohio. Morgan Engrg. Co., Alliance, Ohio. Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

#### **CRANES, Hand Traveling**

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

#### CUTTER GRINDERS

See Grinding Machines, for Sharpening Cutters, Reamers, Hobs, Etc.

#### CUTTERS, Gear

Brown & Sharpe Mfg. Co., Providence, R. I. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 6, Mich.
Fellows Gear Shaper Co., 78 River St., Spring-field, Vt.
Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich.
Marse Twist Drill & Mch. Co., New Bedford,

Morse Twist Drill & Mch. Co., New Section Mass.
Notional Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich. (Shaving).
National Tool Co., 11200 Madison Ave., Cleve-

National Tool Co., 11200 magnets Ave., 2010nd, Ohio.
National Twist Drill & Tl. Co., Rochester, Mich.
Pratt & Whitney, West Hartford 1, Conn.
Standard Tool Co., 3950 Chester Ave., Cleve-

Jand, Ohio.

Union Twist Drill Co., Athol, Mass.
Waltham Mch. Wks., Newton St., Waltham,
Mass.

Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.

#### **CUTTERS, Keyseater**

Davis Keyseater Co., 225 Mill St., Rochester, N. Y. -Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich. troit, Mich.

Keo Cutters, 19326 Woodward, Detroit, Mich.

Threadwell Top & Die Co., 16 Arch St., Greenfield, Mass.

Wesson Co., 1220 Woodward Heights Blvd.,

Ferndale, Mich.

**CUTTERS**, Milling Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.
Atrax Co., Newington, Conn.
Barber-Colman Co., Rock St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I
Carboloy Dept., General Electric Co., Box 237.
Roossevelt Park Annex, Detroit 32, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St.,
Cleveland Ohio. Cleveland, Ohio. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Firth Sterling Steel & Carbide Corp., McKees-32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Ford, M. A., Mfg. Co., 7401 W. 1st St., Davenport, Iowa.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.
Ingersoil Milling Mch. Co., 2442 Douglas St., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Kennametal, Inc., Latrobe, Pa.
Lovejoy Tool Co., Inc., Springfield, Vt.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.
National Twist Drill & Tl. Co., Rochester, Mich.
Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.
Prat: & Whitney, West Hartford 1, Conn. Onsrud Macrine Vivis, 1887, 18 Super 16 Mich.

Mich.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Tomkins-Johnson Co., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.
Willey's Carbide Tool Co., 1340 W. Vernor
Hwy, Detroit 1, Mich.

(Continued on page 352)



Production rate up 1100% when switch is made to

## CARD TAPS

The job was tapping soft steel parts made from SAE 1010 steel. The holes were extruded and tapped 3/6-18 NPT. But with the taps being used a midwest metal fabricator was getting only 200 to 300 tapped holes, which was considered pretty good at the time.

Then somebody said he really ought to be getting more, so the shop superintendent decided to investigate. He called in a Card representative and talked over the matter with him. Solution: A Card High Speed Interrupted Pipe Tap was put on the job. Result: 4,267 tapped holes — or an increase in production of more than 1100%.

Meet him. Your Card representative, backed by Card's

SEE YOUR CARD DISTRIBUTOR FOR PROMPT DELIVERIES AND HELPFUL SERVICE

engineering staff is always available for aid on any problem. S. W. CARD MANUFACTURING COMPANY, Mansfield, Massachusetts. Division of Union Twist Drill Company.



TAPS

Production Proved For Lasting Accuracy

Also makers of DIES . SCREW PLATES . DIE STOCKS
TAP WRENCHES

## More parts in the pan



## and longer tool life mean lower costs with

today's freer cutting screw stock!

N producing the screw machine parts shown  $\blacksquare$  here, (1",  $1\frac{1}{4}$ " and  $1\frac{1}{2}$ " connector bodies) a switch from ordinary Bessemer screw stock to MX produced uniformly superior results: Output was substantially increased. Time between tool grindings was doubled. Both these benefits are highly conducive to savings in cost per part.

Increased production, reduced down-time, better part finish, and lowered part costs, are the usual thing wherever U·S·S Free-Machining MX has been put to work.

Reports from hundreds of shops that have used MX to make close to a billion parts of many different kinds are amazingly alike in one respect. All emphasize the fact that when fast-cutting MX has been given a trial, production has gone up and costs have come down. This has been so uniformly true that we feel safe in saying that MX will cut the cost of any part you now machine from ordinary Bessemer screw stock.

There are four ways in which U.S.S Free-Machining MX can save you money. By permitting higher machine speeds, it saves time and cuts unit costs. By prolonging tool life, it reduces downtime. By assuring better part finish, it often eliminates extra finishing operations. By providing closer dimensional accuracy, your rejections are minimized.

Try MX in your own shop on a production basis. Prove for yourself that MX, despite its slightly higher cost, is actually the most economical bar stock yet developed. And do it soon.

U·S·S Free-Machining MX is being produced in all the popular bar sections and sizes. You can obtain it in cold-finished form from your regular supplier as "MX" or under his own identifying trade name. In hot-rolled form, MX is available direct through our nearest district sales office.

> Production is important now-speed it up and lower your costs with MX

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UNITED STATES STEEL COMPANY, PITTSBURGH AMERICAN STEEL & WIRE DIVISION, CLEVELAND . COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST

UNITED STATES STEEL EXPORT COMPANY, NEW YORK

2-1485



MEMBER NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION

#### **CUTTERS, Retary**

See Files and Burs, Rotary.

#### **CUTTING COMPOUNDS**

See Compounds, Cutting, Grinding, Etc.

#### CUTTING AND GRINDING FLUIDS

Cimcool Div., Cincinnati Milling Mch. Co., Cincinnati, Ohio. Cities Service Oil Co., 70 Pine St., New York, N. Y.
DoAli Co., 254 Laurel Ave., Des Plaines, III.
Houghton, E. F., & Co., 303 W. Lehigh Ave.,
Philadelphia, Pa.
Shell Oil Co., 50 West 50th St., New York,
N. Y.
Sinclair Refining Co., 630 5th Ave., New York,
N. Y.
Standard Oil Co. (Indiana), 910 S. Michigan,
Chicago, III.
Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St.,
Chicago 23, III.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Texas Co., 135 E. 42nd St., New York, N. Y.
Tide Water Associated Oil Co., 17 Battery
Place, New York, N. Y.

#### **CUTTING-OFF MACHINES**

Bardons & Oliver, Inc., Ft. W. 9th St., Cieveland 13, Ohio.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Mch. Co., Windsor, Vt. (Lathe Type).
Consolidated Mch. Tool Co., Rochester, N. Y.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Landis Machine Co., Waynesboro, Pa. (Pipe).
Modern Machine Tool Ce., 601 S. Water St.,
Jackson, Mich. (Lathe Type for Tubing).

#### CUTTING-OFF MACHINES, **Abrasive Wheel**

Campbell Mch. Div., American Chain & Cable 929 Conn. Ave., Bridgeport, Conn. Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y.

#### CUTTING-OFF MACHINES, Cold Saw

See Sawing Machines, Circular.

#### CUTTING-OFF MACHINES, **Metal Band Saws**

Armstrong-Blum Mfg. Co., 5700 W. Blooming-dole Ave., Chicogo, III.
DoAII Co., 254 Laurel Ave., Des Plaines, III.
Famco Machine Co., 1300 18th St., Racine, Wis.
Grob Bros., Grafton, Wis.

#### **CUTTING-OFF TOOLS**

CUTTING-OFF TOOLS

Allegheny Ludium Steel Corp., Pittsburgh, Pa. Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.
Kennametal, Inc., Latrobe, Pa.
Luers, J. Milton, 12 Pine St., Mt. Clemens, Mich.
Pratt & Whitney, West Hartford 1, Corn.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.
Williams, J. H., & Co., 400 Vulcan St., Buffale
7, N. Y.

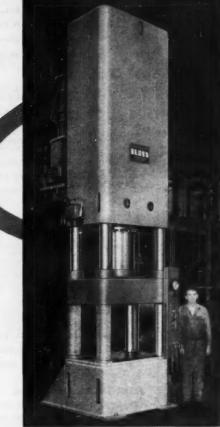
#### **CUTTING-OFF WHEELS, Abresive**

Bay State Abrasive Co., Westboro, Mass. Carborundum Co., Buffalo Ave., Niagara Falls, N. Y. Norton Co., 1 New Bond St., Worcester, Mass.

#### CYLINDER BORING MACHINES

Baker Bros., Inc., Sta. F, P. O. Box 101, Toledo 10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, Ill. Consolidated Mch. Tool Corp., Rochester, N. Y. Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Ex-Cell-O Corp., 1200 Oakman Bivd., Detroit 32, Mich. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill. Moline Tool Co., 102 20th St., Moline, Ill. Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.

(Continued on page 354)



Elmes Pipeless Press designed for use in hot or cold nosing of artillery projectiles. Note complete absence of conventional high-pressure piping in main hydraulic circuit.



Rear view of upper section of above press, showing Pipeless Pumping Unit. The only pipes on entire press are pilot lines, pressure gauge line, and drain lines. Of these, only the pressure gauge line carries high-pressure fluid.

# Munitions Manufacturer "DIRECT HIT" Scores ON MAINTENANCE COSTS!

## ...with Elmes PIPELESS Hydraulic Presses

Shown here is one of a group of Elmes Pipeless Hydraulic Presses recently installed in the plant of a large munitions manufacturer. These revolutionary new-type presses will be used in the production of artillery projectiles.

High production and virtual elimination of downtime are assured by the Elmes Pipeless design which puts an end to high-pressure piping troubles.

The main hydraulic circuit in this new-type press has no piping. All high-pressure fluid is conducted through short, direct passages drilled in the structural parts. There are no high-pressure screwed joints to loosen, no oil dripping from loosened pipe or fittings, no welded joints to break.

Now you can get the superior advantages of Elmes hydraulic power—speed, accuracy, instant response, smooth operation—plus matchless economies of the Pipeless principle, all at no premium.

Any type of Elmes Hydraulic Metal-Working Press can be supplied with the new Pipeless construction. Get the facts on this outstanding Elmes development now!

#### WRITE FOR PIPELESS PRESS BULLETIN 1011

Fully illustrates and describes in detail the production-increasing, cost-reducing features of these revolutionary newtype metal-working presses.

#### American Steel Foundries

#### ELMES ENGINEERING DIVISION

1162 TENNESSEE AVENUE . CINCINNATI 29. OHIO

DISTRIBUTORS IN PRINCIPAL INCUSTRIAL CENTERS ----- ALSO MANUFACTURED IN CANADA

RTAL WORKING PRESSES . PLASTIC MOLDING PRESSES . EXTRUSION PRESSES . PUMPS . ACCUMULATORS . VALVES . ACCESSOS

#### LEVELAND tapping machines

lead screw

What's Your Tapping Problem?

Check with Cleveland first if you have a tapping problem. Cleveland engineers have solved hundreds of problems like these.

#### MM SHELLS

For a munitions maker we designed a Cleveland Tapper which taps two 20MM shells per machine stroke at the rate of 1180 pieces per hour. It uses a stroke of 1/2" cutting at a spindle speed of 420 RPM at 68 SFM with a tapping cycle of 36 turns or 5.1 seconds plus 1.0 second for the table



#### SWEEPER BODIES



For a leading appliance manufacturer Cleveland engineers designed a Cleveland Tapper to tap four 10-24 and one 6-32 holes in the top face of the main casting and five 10-24 and two 8-32 holes in the bottom face ... both sides simultaneously all with lead screw controlled spindles for complete accuracy.

#### ROCKET PARTS

Cleveland engineers designed and built a Cleveland Tapper which turns out 3.5 rocket bodies at the rate of 100 pieces per hour. Cleveland Tappers are saving priceless man hours on defense and civilian production jobs.



#### Mr. Lead Screw says:



Only a Cleveland Tapper offers you ALL the features you want...Quickly changed spindle speeds... Heat treated alloy spindles...Precision depth control...Super sensitive clutch . . . Positive coolant and lubricant supply. Check with Cleveland First if you need to do Tapping, Threading, Chamfering, and Core Drilling. Write for your copy of Catalog V-19



THE CLEVELAND TAPPING MACHINE CO A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC CANTON 6. OHIO



#### CYLINDERS, Air

Hanna Engineering Works, 1752 Elston Ave., Chicago, III. Hannifin Corp. 1101 S. Kilbourn Ave., Chicago, III.
Mead Specialties Co., 4114 North Knox Ave.,
Chicago 41, III.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.
Tomkins-Johnson Co., Jackson, Mich.

#### CYLINDERS, Hydroulic

Barnes, John S., Corp., Rockford, III. Hanna Engineering Works, 1752 Elston Ave., Chicago, III. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III. III.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gileod, Ohio.
Logansport Machine Co., Inc., Logansport, Ind.
National Forge & Ordnance Co., Irvine, Warren
County, Pa.
Rivet Lathe & Grinder, Inc., Brighton, Boston 35, Mass. Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, III.
Tomkins-Johnson Co., Jackson, Mich.

#### **DEALERS**, Machinery

Botwinik Bros. of Mass., Inc., 14 Sherman St., Worcester, Mass.
Earle Gear & Mch. Co., 4707 Stenton Ave., Wayne Junction, Philadelphia 44, Pa.
Motch & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
Simmons Mch. Tool Corp., 1600 N. Broadwav. Albany, N. Y.

#### DEMAGNETIZERS

Blanchard Mch. Co., 64 State St., Cambridge, Mass. Heald Mch. Co., 10 New Bond St., Worcester 6, Walker, O. S., Inc., Worcester, Mass.

#### **DESIGNERS, Machine and Tool**

DESIGNERS, Machine and Tool

Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.

Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.

Pioneer Engrg. & Mfg. Co., 19679 John R St., Detroit, Mich.

Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich.

Pratt & Whitney, West Hartford 1, Conn.

Sheffield Corp., 721 Springfield, Dayton, Ohio.

Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.

Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.,

Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

#### DIAMONDS AND DIAMOND TOOLS

Meyers, W. F., Co., Bedford, Ind. Precision Diamond Tool Co., 102 South Grave Ave., Elgin, III.

See Castings, Die.

#### DIE-CASTING MACHINES

British Industries Corp., International Mchrv.
Div., 164 Duane St., New York, N. Y.
Cleveland Automatic Machine Co., 4932 Beech
St., Cincinnati 12, Ohio.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.
Kux Machine Co., 3930 W. Harrison St.,
Chicago, III.
Lake Erie Engineering Corp., Kenmore Station,
Buffolo, N. Y.
Reed-Prentice Corp., 677 Cambridge St., Worcester, Mass.

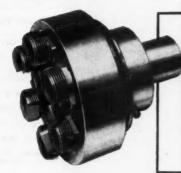
Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Clearing Mch. Corp., 6499 W. 65th St., Chi-cago, III. Creating Microscopy, 181.
Dayton Rogers Mfg. Co., 2824 13th Ave., S., Minneopolis 7, Minn.
Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, III. (Continued on page 356)

## NAMCO VERS-O-TOOLS and COLLAPSIBLE TAPS SET THE STANDARD

for continuous, high production on rocket tube threading

On this rocket job these Namco threading tools outperformed any other method—in time-saving, in sustained quality and in trouble-free operation. The procedures we helped work out for the first pilot installation have since been adopted as standard at ten other plants contracting for the same job.

Regardless of the type of threading work you are doing, may we show you how the same basic principle can be applied to save you time, money and materials—with Namco Vers-O-Tools and Collapsible Taps?

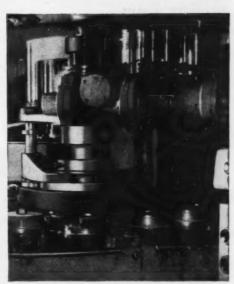


#### **JOB FACTS**

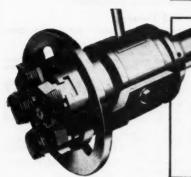
PART—Rocket Nozzle MATERIAL—X 1117 Steel

OPERATION—Thread 43/4" Diameter, 12 Pitch, Class 2 Fit MACHINE—W.F. and John Barnes

DIEHEAD—Namco Type DR 4<sup>7</sup>/<sub>8</sub>" Vers-O-Tool with 6 ground thread circular chasers



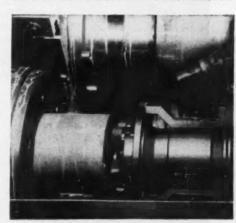
Nameo Type DR Vers-O-Tool Die Head threading rocket nozzles on a W. F. and John Barnes Drill— Firestone Steel Products Division Plant, Akron, Ohio



#### JOB FACTS

PART—Rocket Motor Tube
MATERIAL—NEA-8620 Steel, heattreated to Rockwell C-28-30
OPERATION—Tap 43/4" Diametor, 12 Pitch, Class 2 Fit
MACHINE—Lehman Double-End
Tapper

TAP—Numco Type RST 5" Collapsible with 5 ground-thread circular chasers.



Nameo Type RST Collapsible Tap tapping rocket motor tube on Lehman Double End Tapper—Firestone Steel Products Division Plant, Akron, Ohio

#### ASK FOR NEW CATALOG DT-52...

for complete information on Namco Vers-O-Tools and Namco Collapsible Taps, available with ground thread precision chasers.



The NATIONAL ACME CO.

170 EAST 131st STREET . CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics:
1-4-6 and 8 Spindle - Hydraulic Thread
Rolling Machines - Automatic Threading Dies
and Taps - The Chronolog - Limit, Motor Starter
and Control Station Switches - Solenoids
Centrifuges - Contract Manufacturing

#### DIE INSERTS, Carbide

Adomas Carbide Corp., 999 South 4th St., Harrison, N. J.
Allepheny Luddium Steel Corp., Pittsburgh, Pa. Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Kennametal, Inc., Latrobe, Pa. Kennametal, Inc., Latrobe, Pa. Metal Carbides Corp., Youngstown, Ohio. Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

#### DIEMAKERS' SUPPLIES

Allied Products Corp., 12677 Burt Rd., Detroit Alliad Products Corp., 12677 Burt Rd., Detroit 23, Mich.
Daniy Mch. Specialties, Inc., 2107 5. 52nd Ave., Chicago 50, III.
Detroit Die Set Corp., 2895A W. Grand Biva., Detroit 2, Mich.
Producto Mch. Co., 990 Housatonic Ave., Bridgeport, Conn.
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

#### DIEMAKING MACHINES

Grob Bros., Grafton, Wis. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Kearney & Trecker Corp., Milwaukee, Wis. Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.

#### DIE SETS, Standard

Danly Mch. Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, III. Detroit Die Set Corp., 2895A W. Grand Biva., Detroit 2, Mich. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y. hasset, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Producto Mch. Co., 990 Housatonic Ave.,
Bridgeport, Conn.
Wales-Strippit Corp., North Tonawanda, N. Y.

#### DIE-SINKING MACHINES

American Steel Foundries, Elmes Engrg. Div. Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Cincinnati Milling Mch. Co., Cincinnati, Ohio. Garton, George, Machine Co., 1110 W. 13th St., Racine, Wis. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Pratt & Whitney, West Hartford 1, Conn. Reed-Prentice Corp., 677 Cambridge St., Wor-cester, Mass.

#### DIE-SINKING PRESSES

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Kearney & Trecker Corp., Milwaukee, Wis.

7

3

#### DIE STOCKS

See Stocks, Die.

#### DIES, Sheet Metal, Etc.

Allied Products Corp., 12677 Burt Rd., Detroit 23, Mich. Saih, Co., 6984 Machinery Ave., Cleveland 3, Ohio.
Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio.
Carboloy Dept., General Electric Co., Box 237,
Roosevelt Park Annex, Detroit 32, Mich.
Chambersburg Engra. Co., Chambersburg, Pa.
Columbus Die, Tool & Mch. Co., 955 Cleveland
Ave., Columbus, Ohio.
Dreis & Krump Mfg. Co., 7416 Loomis Blvd.,
Chicago 36, Ill.
Ferracute Mch. Co., Bridgeton, N. J.
Ford, M. A., Mfg. Co., 7401 W. 1st St., Davenport, Iowa. Ford, M. A., Mfg. Co., 7401 W. 1st St., Davenport, Iowa.
Jahn, B., Manufacturing Co., Ellis St., New
Britain, Conn.
Metal Carbides Corp., Youngstown, Ohio.
Niagara Mch. & Tool Wks., 683 Northland
Ave., Buffalo, N. Y.
Pioneer Pump & Mfg. Co., 19679 John R St.,
Detroit, Mich.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Taft-Pelice Mfg. Co., Woonsocket, R. I.
V & O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y.
Verson Allsteel Press Co., 93rd St. and S.
Kenwood Ave., Chicago, III.
Wales-Strippit Corp., North Tonawanda, N. Y.
Waltham Mch. Wks., Newton St., Walthan,
Mass.

#### DIES, Threading

Line, Vt.
Card, S. W., Mfg. Co., Mansfield, Mass.
Detroit Tap & Tool Co., Detroit, Mich.
Eastern Mch. Screw Corp., New Haven, Conn.
Geometric Tool Co., Westville Station, New
Haven 15, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hill Acme Co., 1201 W. 65th St., Cleveland 2,
Obio. Ohio.
Morse Twist Drill & Mch. Co., New Bedford,
Moss.
National Acme Co., 170 E. 131st St., Cleveland, Ohio. Pratt & Whitney West Hartford 1, Conn. Sheffield Corp. 721 Springfield, Dayton, Ohio. Standard Tool Co., 3950 Chester Ave., Cleveland. Ohio Threadwell Tap & Die Ca., 16 Arch St., Green-field. Mass Winter Bros. Co., Rochester, Mich.

#### DIES, Threading, Opening

Esstern Mch. Screw Corp., New Haven, Conn. Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y., Geometric Tool Co., Westville Station, New Haven 15, Conn.
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio. Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt. Landis Mch. Co., Waynesboro, Pa. National Acme Co., 170 E. 131st St., Cleveland, Ohio. Sheffield Corp., 721 Springfield, Dayton, Ohio.

#### DIES, Thread Rolling

Detroit Tap & Tool Co., Detroit, Mich. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Pratt & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio.

#### DISCS, Abrasive

Besly-Welles Carp., Beloit, Wis. Carborundum Co., Buffalo Ave., Niagara Falls, N. Y. Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.

(Continued on page 358)



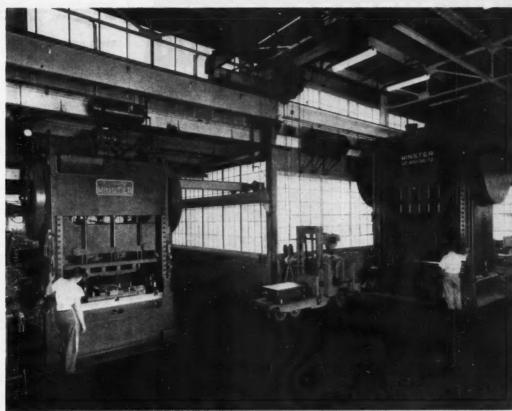


Photo-Courtesy East Dayton Tool & Die Co.

#### IN DAYTON, OHIO, TOOL SHOPS

#### More Minster Try-out Presses Than all Other Makes Combined

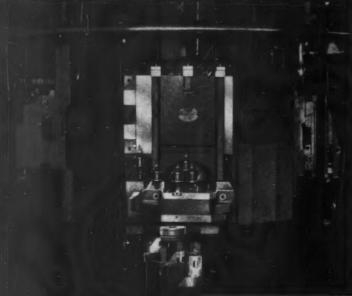
Dayton, Ohio, one of America's greatest tool making centers, expresses an overwhelming preference for Minster presses. In all Dayton shops, large and small, 36 out of 62 presses used for try-out work are Minsters.

Remember this preference for Minster presses the next time you need press equipment. Minster offers excellence of design, performance at its finest, service of unusual dependability.

THE MINSTER MACHINE COMPANY, MINSTER, OHIO



#### 434" THREADS ROLLED ON ROCKET PARTS WITH SALVO THREAD ATTACHMENTS



Firms producing special 434"-12 threads on close tolerance Rocket parts have encountered a ticklish problem of holding diameters perfectly concentric. Moving the part from one machine to another caused loss of thread alignment and required 100% inspection.

To solve this problem, SALVO designed Thread Rolling Attachments on a standard cross turning slide of the Bullard MULT-



43/4"-12 Thread Rolled In Bullard MULT-AU-MATIC

AU-MATIC. The huge thread is quickly and accurately rolled in the Bullard's normal cycle time, insuring exact alignment with shoulders and faces and a 100% saving in threading labor!

Simple spot inspection now suffices, and users of SALVO-equipped machines have been turning out this large diameter thread in production quantities for 18 months at a cost of a fraction of a cent each.

#### GUARANTEE

Salvo builds thread rolls and attachments in any size and design thread for all production ma-Write us, stating your threading problems. Salvo Attachments are installed by our engineers and are guaranteed under a 15-day

Remember Salvo . . . FOR BETTER BURNISHING, KNURLING, AND OIL **GROOVING, TOO!** 

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#### DIVIDING HEADS

See Index Centers.

#### DOWEL PINS

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn. Conn.
Danly Mch. Specialties, Inc., 2107 S. 52nd Ave.,
Chicago 50, Ill.
Detroit Die Set Corp., 2895A W. Grand Blvd.,
Detroit 2, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.

S. Tool Co., Inc., 255 North 18th St.,
Ampere, N. J.

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Universal Drafting Mch. Corp., 7960 Lorain Ave., Cleveland, Ohio.

#### **DRESSERS, Grinding Wheel**

Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Erickson Tools Div. Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio.

Ex-Cell-O Corp., 1200 Oakman Bivd., Detroit 32, Mich.
Hoglund Engrg. & Mfg. Co., Inc., Berkeley Heights, N. J.
Metal Carbides Corp., Youngstown, Ohio. Meyers, W. F., Co., Bedford, Ind.
Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.
Norton Co., 1 New Bond St., Worcester, Mass. Sheffield Corp., 721 Springfield, Dayton, Ohio. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio. January 1001 Co., 3950 Chester Ave., Cleveland, Ohio.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

#### DRIFTS, Drill

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Standard Tool Co., 3950 Chester Ave., Cleve-land, Ohio.

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Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Barnes Drill Co., 814 Chestnut, Rockford, Ill. Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. Buffalo Forge Co., 490 Broodway, Buffalo, N. Y.
Canedy-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.
Commander Mfg. Co., 4233 W. Kinzie St., Chicago 4, Ill.
Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor, Mich.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Patrington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y.
Ettco Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Moline Tool Co., 102 20th St., Moline, Ill.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Thriftmaster Products Corp., 1076 N. Plum St., Lancaster, Pa.
United States Drill Head Co., 616 Burns, Cincinnati, Ohio.
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

#### DRILL HEADS, Unit Type

Barnes Drill Co., 814 Chestnut, Rockford, Ill.
Commander Mfg. Co., 4233 W. Kinzie St.,
Chicago 4, Ill.
Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh 8, Pa.
Kingsbury Mch. Tool Corp., Keene, N. H.
Rehnberg-Jacobson Mfg. Co., 2135 Kishwaukee
St., Rockford, Ill.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.

#### DRILL SOCKETS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass. National Twist Drill & Tool Co., Rochester, National Iwist Critical Mich.
Prott & Whitney, West Hartford I, Conn.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass. (Continued on page 360)



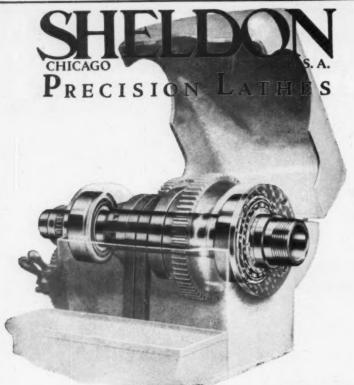
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BAKER'S DOZEN, they used to call it, meaning something extra. We make the something extra in the world of steel . . . the high-alloy steels, special electrical alloys and magnetic materials that will do what ordinary metals never could do.

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... "ZERO PRECISION" TIMKEN TAPER ROLLER BEARINGS

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- Rigid, Heavily crossstrutted 1-piece Beds-2 V-ways, 2 Flat ways
- · Full Double-Walled Aprons—all gear shafts supported on both ends.
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- Twin V-Belts to Spindle for extra power.



No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the exact type and tolerances of bearings used.

The No. TS-56B (and several other) SHELDON Precision Lathes have Timken "Zero Precision" Taper Roller Bearings, held to tolerances of .00015". Not only are these the most accurate bearings used in any lathe, they are the sturdiest type . . . hold their accuracy thru long hard use . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly

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Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass. National Twist Drill & Tool Co., Rochester, Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio. Union Twist Drill Co., Athol, Mass.

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Commander Mfg. Co., 4233 W. Kinzie St., Chicago 4, III.

#### **DRILLING MACHINES, Automotic**

Avey Drilling Machine Co., 25 E. Third St., Covington, Ky.
Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, III.
Barnes, W. F. & John, Co., 201 S. Woter St., Rockford, III.
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.
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Canedy-Otto Div., Cincinnati Lathe & Tool Co.,
Oakley, Cincinnati, Ohio.
Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh 8, Pa.
Dumore Co., 1300 17th St., Racine, Wis.
Famco Machine Co., 1300 18th St., Racine,
Wie. Wis.
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
Hamilton Tool Co., 834 South 9th St., Hamilton, Ohio.
Henry & Wright Div., Emhart Mfg. Co., 760
Windsor St., Hartford 1, Conn.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.
Wolker-Turner Div., Kearney & Trecker Corp.,
South Ave., Plainfield, N. J.

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#### DRILLING MACHINES, Deep Hole

Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Morris Machine Tool Co., 9 Harriet St., Cincinnat 3, Ohio.
National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.
Prat & Whitney, West Hartford 1, Conn.
Wales-Strippit Corp., North Tonawanda, N. Y.

#### DRILLING MACHINES, Gong

Avey Drilling Machine Co., 25 E. Third St., Covington, Ky.
Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, Ill..
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.
Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio. eereman Mch. Tool Co., Green Bay, Wis. onsolidated Mch. Tool Corp, Rochester, N. Y. (Continued on page 362)



## Machine Against Muscle

### THE STORY OF WHY A FAMOUS COMPANY SEES FIT TO TAKE A NEW NAME

In 1924 the dream of a man named Joseph W. Sullivan was realized in a revolutionary new tool that was to take the industrial world by storm. The portable power saw was born and a young company was off to a flying start.

Inevitably, the success of this new power tool attracted imitators, brought others to the field. In spite of this, Skilsaw, Inc., maintained a leadership which continues to keep it first in the field.

With this remarkable growth came stronger and stronger demand from all industry for other kinds of power tools built with SKIL Quality, other ways to replace muscle with machine and do jobs better, with less work in less time. Skilsaw, Inc., has answered this demand—now offers more than 160 different models of portable power tools, each one an example of the finest engineering and quality in the field—SKIL Quality!

So it is with justifiable pride that we now alter a corporate name we have in simple fact outgrown. Hereafter, the company long known as Skilsaw, Inc., will be known as SKIL Corporation, the name to be remembered in the manufacture, sale and service of portable power tools.

#### **SKIL Corporation**

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26 DIFFERENT TOOLS BESIDES SAWS...IN OVER 160 MODELS



### FOR Trictly IMPERSONAL INSPECTION MISS DIAL COMPARATORS

Ames Dial Comparators make the inspection of duplicate parts an extremely simple, rapid and accurate operation. Ames Comparators are strictly impersonal in their accuracy - the results being in no way dependent on the skill or judgment of the operator. The pressure of the gauging members against the work is mechanically determined and therefore uniform.

> Check the Ames Dial Comparators shown - one of them may solve a Quality Control problem for you.



Ames No. 1 Dial Comparator is an easily adjustable bench model that measures objects up to 2" in cross section. The table bracket may be quickly located and locked in position on the column. The table itself may be further positioned and locked for final fine adjustment. This comparator is designated Ames No. 1W when equipped with dead-weight contact pressure and contact area to ASTM specifications for measuring resilient materials, such as rubber, plastics, etc.



Ames No. 2 Dial Comparator is a compact, stable bench model for measuring non-yielding materials - sheet metal, glass, hard rubber. The 2" diameter table is adjustable to bring pointer to zero. Ames No. 2W is similar to the Ames No. 2, but is furnished with dead-weight contact pressure and contact areas to ASTM specifications for checking textiles, plastics, sheet rubber, etc.



Ames No. 13 Dial Comparator features flat-ground, cast-iron base of ample size for using V-blocks and locating fixtures for checking rounds, flats and odd shapes. Also, the No. 13 can be fitted with a fine adjustment for close setting. Accurately adjustable bracket holds any Ames Micrometer Dial Indicator.



Ames No. 130 Dial Comparator is designed especially for inspecting comparatively large parts. For this reason, the flat-ground steel base, the adjustable indicator support on which can be mounted any Ames Micrometer Dial Indicator, and the upright column are proportioned to suit the user's particular requirements.

Send us your Quality Control job specifications, and we will supply complete details and proposal without obligation.

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Moline Tool Co., 102 20th St. Moline, Ill.
Morris Machine Tool Co., 9 Harriet St., Cincinnati 3, Ohio.
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#### DRILLING MACHINES, Horizontal Duplex

Horizontal Duplex

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Baush Mch. Tool Co., 156 Wason Ave., Springfield 7, Mass.
Consolidated Mch. Tool Corp., Rochester, N. Y. Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.
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Kingsbury Mch. Tool Corp., Keene, N. H.
Millholland, W. K., Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind., Moline Tool Co., 102 20th St., Moline, Ill.
Morris Machine Tool Co., 9 Harriet St., Cincinnati 3, Ohio.
National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.
Snow Mfg. Co., 435 Eastern Ave. Bellwood, Ill.
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DRILLING MACHINES, Multiple Spindle

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Barnes Drill Co., 814 Chestnut, Rockford, Ill.

Barnes, W. F. & John, Co., 201 S Water St.,
Rockford, Ill.

Baush Mch. Tool Co., 156 Wason Ave., Springfield 7. Mass.

Buffaio Forge Co., 490 Broadway, Buffaio, N. Y.
Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor,
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Burg Tool Manufacturing Co., 3743 Durango
Ave., Los Angeles 31, Colif.

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Cincinnati Bickford Tool Co., 3220 Forrer Ave.,
Cincinnati, Ohio.

Cleereman Mch. Tool Co., Green Bay, Wis.
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N. Y.

Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.
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Milwaukee 14, Wis.

Delta Power Tool Div., Rockwell Mfg. Co.,
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Wis.

(Continued on page 364)

Quality threading

DEL TO-615 15 Inch

The 6x15 Automatic Thread Grinder is used for high production thread grinding with either single or multiribber wheels on relatively small parts.

#### AT MINIMUM COST

#### JONES & LAMSON AUTOMATIC THREAD GRINDERS:

Produce threads of better quality and more uniform finish

Reduce handling cost

Eliminate costly rethreading after heat treatment

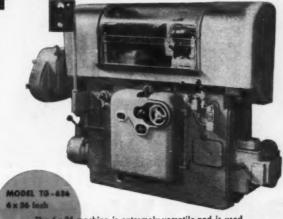
Eliminate expensive retooling when specifications change

Reduce cost of gage maintenance

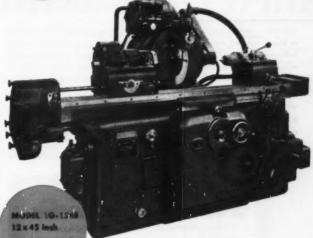
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Right and left hand threading

When measuring the value of a thread grinder remember the extra benefits of J&L top-flight construction. Write Dept. 710 for illustrated catalog.



The 6x36 machine is extremely versatile and is used on long of short run jobs on a great variety of precision threaded parts. Single or multi-ribbed wheels on be used.



The 12 x 45 machine is used for grinding threads on a wide range of work from small to large heavy parts.

Single or multi-ribbed wheels can be used.

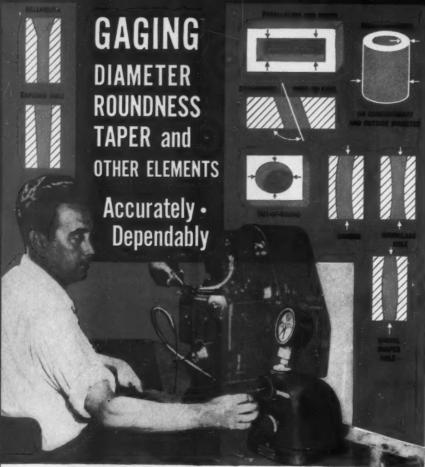
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Machine Tool Craftsmen Since 1835

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THREAD GRINDER DIVISION

MACHINERY, October, 1952-363



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Bulletin 524-1

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Kingsbury Mch. Tool Corp., Keene, N. H.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.

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National Automatic Tool Co., Inc., S. 7th and N. Sts., Richmond, Ind.
Praft & Whitney, West Hartford 1. Conn.
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Carlton Mch. Tool Co., 3000 Spring Grove Ave.,
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Cincinnati Bickford Tool Co., 3220 Forrer Ave.,
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Beekman St., Cincinnati 83, Ohio.
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Famco Machine Co., 1300 18th St., Racine,
Wis.
Foote-Burt Co., 1300 St. Clair Ave., Cleveland
8, Ohlo.
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohlo.
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Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.

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Morris Machine Tool Co., 9 Harriet St., Cin-cinnati 3, Ohio.
National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.
Pratt & Whitney, West Hartford 1, Conn.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.
Wales-Strippit Corp., North Tonawanda, N. Y.

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Avey Drilling Machine Co., 25 E. Third St.,
Covington, Ky.

Baker Bros., Inc., Station F, P. O. Box 101,
Toledo 10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, Ill.
Barnes, W. F. & John, Co., 201 S. Water St.,
Rockford, Ill.
Baush Mch. Tool Co., 156 Wason Ave., Springfield 7, Mass.

Buffalo Forge Co., 490 Broadway, Buffalo,
N. Y.
Conedy-Otto Div., Cincinnati Lathe & Tool Co.

N. Y.
Canedy-Otto Div., Cincinnati Lathe & Tool Ce.,
Oakley, Cincinnati, Ohio.
Cincinnati Bickford Tool Co., 3220 Forrer Ave.,
Cincinnati, Ohio.
Cleereman Mch. Tool Co., Green Bay, Wis.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Cosa Corp., 405 Lexington Ave., New York 17,
N. Y.

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Foote-Burt Co., 1300 St. Clair Ave., Cleveland 8, Ohio.
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
Hartford Special Mchry. Co., 287 Homestead 5t., Hartford, Conn.
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Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y.
Orbon, Kurt, Co., 205 E. 42nd St., New York 17, N. Y.
Rehnberg-Jacobson Mfg. Co., 2135 Kishwaukee St., Rockford, III.
Rogers Machine Works, Inc., Buffalo 10, N. Y.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, III.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Wales-Strippit Corp., North Tonawanda, N. Y.

#### DRILLING MACHINES, Wall Radial

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio. Consolidated Mch. Tool Corp., Rochester, N. Y.

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Cleveland Twist Drill Co., 1242 E. 49th St. Cleveland, Ohio. Gorham Tool Co., 14400 Woodrow Wilson, De-troit, Mich. Greenfield Top & Die Corp., Greenfield, Mass. Keo Cutters, 19326 Woodward, Detroit, Mich. Morse Twist Drill & Mch. Co., New Bedford, Mass National Twist Drill & Tool Co., Rochester,

National Twist Drill & Tool Co., Rochester, Mich. Standard Tool Co., 3950 Chester Ave., Cleve-land, Ohio. Union Twist Drill Co., Athol, Mass. Warner & Swasey Co., 5701 Carnegie Ave.. Cleveland 3, Ohio.

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DRILLS, Core

Adamas Carbide Corp., 999 South 4th St.,
Harrison, N. J.
Carboloy Dept., General Electric Co., Box 237,
Roosevelt Park Annex, Detroit 32, Mich.
Erickson Tools Div. Erickson Steel Co., 2309
Hamilton, Cleveland, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon
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Morse Twist Drill & Mch. Co., New Bedford,
Mass. National Twist Drill & Tool Co., Rochester. Mich. pper Tool Co., 21650 Hoover Rd., Detroit 13. Mich.
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Wesson Co., 1220 Woodward Heights Blvd.,
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Willey's Carbide Tool Co., 1340 W. Vernor
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#### **DRILLS, Deep Hole**

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Chicago Pneumatic Tool Co., 6 E. 44th St.,
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Dumore Co., 1300 17th St., Racine, Wis.
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Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Skil Corp., 5039 Elston Ave., Chicago, Ill.

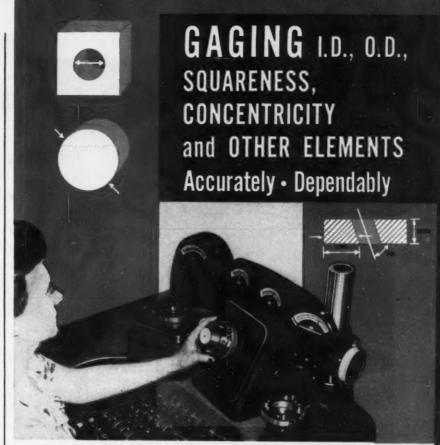
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(Continued on page 368)



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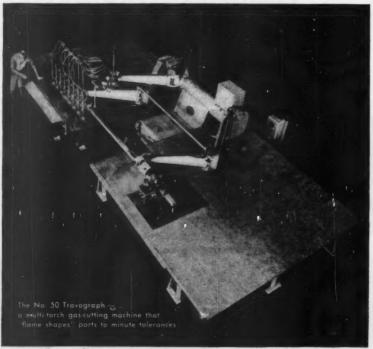


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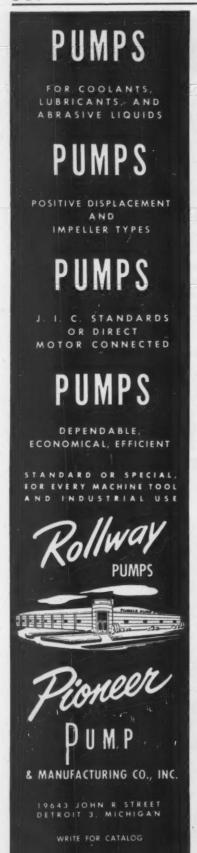
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land, Ohio.
Jinion Twist Drill Co., Athol, Mass.

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Pangborn Corp., Hagerstown, Md. Torit Mfg. Co., 307 Walnut St., St. Paul 2.

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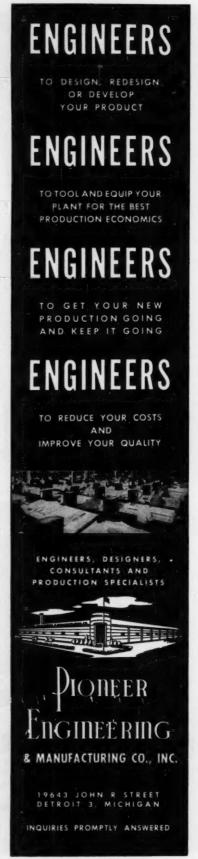
#### FANS, Exhaust, Electric Ventilating

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. General Electric Co., Schenectady 5, N. Y.

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Gederal Press Co., 600 Division and Big Four R. R., Elkhart, Ind.
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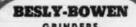
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MACHINERY, October, 1952-369

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Severance Tool Industries, Soginaw, Mich. Soginaw, Mich. Simonds Saw & Steel Co., 470 Main St., Fitch-

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#### FILES AND BURS, Rotary

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Ford, M. A., Mfg. Co., 7401 W. 1st St., Davenport, lowa.
Jarvis, Chas. L., Co., Middletown, Cann.
Pratt & Whitney, West Hartford 1, Conn.
Severance Tool Industries, Inc., 636 lowa Ave.,
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Wesson Co., 1220 Woodward Heights Blvd.,
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Bethlehem Steel Co., Bethlehem, Pa. National Forge & Ordnance Co., Irvine, Warren

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Bethlehem Steel Co., Bethlehem, Pa.

Chambersburg Engrg. Co., Chambersburg, Pa.

Cincinnati Shaper Co., Elam and Garrard Ave.,

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Cleveland Punch & Shear Works Co., 3917 St.

Clair Ave., N. E., Cleveland, Ohio.

Columbia Machinery & Engineering Corp.,

Hamilton I, Ohio.

Consolidated Mch. Tool Corp., Rochester, N. Y.

Dreis & Krump Mfg. Co., 7416 Loomis Blvd.,

Chicago 36, Ill.

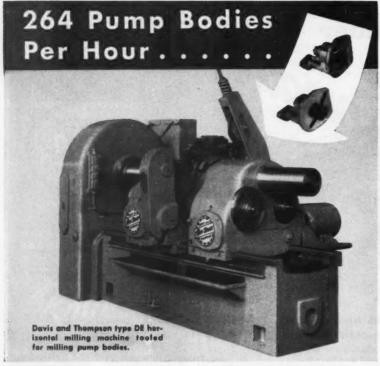
Ferracute Machine Co., Bridgeton, N. J.

Hannlifin Corp., 1101 S. Kilbourn Ave., Chicago,

Ill.

III.
Hufford Machine Works, Inc., 1700 E. Grand
Ave., El Segundo, Calif. (Stretch-Wrap).
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Niagara Mch. & Tool Works, 683 Northland
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(Continued on page 372)



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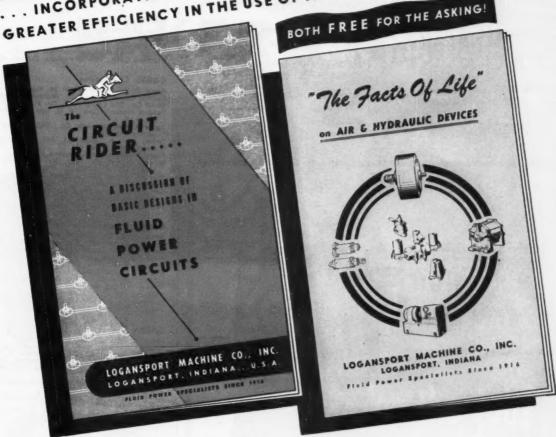
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Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
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Hydropress, Inc., 350 Fifth Ave., New York 1,
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Niagara Mch. & Tool Works, 683 Northland
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Nilson, A. H., Mch. Co., 1506 Railroad Ave.,
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U. S. Tool Co., Inc., 255 North 18th St.,
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Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carban Corp., 30 E. 42nd St., New York Kennametal, Inc., Latrabe, Pa.
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Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

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Sheffield Corp., 721 Springfield, Dayton, Ohio.
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Starrett, The L. S., Co., Athol, Mass.

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GAGES, Height

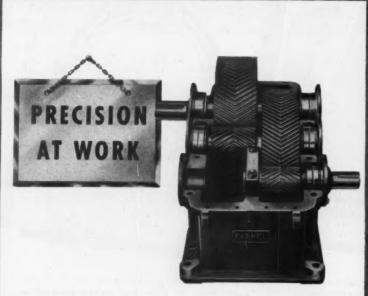
Ames, B. C., Co., Waltham 54, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Homestrand, Inc., Larchmont, N. Y.
Neise, Karl A., Dept. M., 381 Fourth Ave.,
New York 16, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Starrett, The L. S., Co., Athol, Mass.

#### GAGES, Plug, Ring and Snap

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif. Brown & Sharpe Mfg. Co., Providence, R. I. Corboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. DoAll Co., 254 Laurel Ave., Des Plaines, III. Federal Products Corp., P. O. Box 1027, Providence, R. I. Firth Sterling Steel & Carbide Corp., McKeesport, P. port, Pa.

Greenfield Tag & Die Corp., Greenfield, Mass.
Haynes Stellite Div., Union Carbide & Carbon
Corp., 30 E. 42nd St., New York.
Kennametal, Inc., Latrobe, Pa.
Metal Carbides Corp., Youngstown, Pa.
Morse Twist Drill & Mch. Co., New Bedford,
Mass.

(Continued on page 374)



The quiet, vibration-free performance of Farrel herringbone gears is the result of extreme accuracy of tooth spacing, contour and helix angle, and other qualities inherent in the Farrel-Sykes method of gear generation. Why these gears continue to operate so quietly, after many years of service, is shown by the diagram illustrating the nature of the contact between a pair of Farrel gears.

The lines of contact are oblique across the face of the teeth, and the pressure is evenly distributed over each tooth, from tip to working depth line. This means that there is no tendency for the contour of the teeth to wear unevenly.

Farrel herringbone gears are made of the finest grade materials, in a complete range of sizes from 1/4 inch to 20 feet in diameter. Write for further information or for engineering assistance.

#### FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

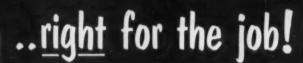
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron,
Detroit, Chicage, Minneapolis, Portland (Oregon), Los Angeles, Salt
Lake City, Tulsa, Houston, New Orleans

FB-744

AM

LIGHT or HEAVY STANDARD or SPECIAL

BAKER has the drill...



Regardless of the job requirement, Baker engineers have the know-how to provide drilling machines that will do the job better! Where production figures are of primary importance, Baker will greatly increase productivity . . . and for standard drills over inch and a half capacity . . . there's a Baker right for every job. Consult Baker for better drilling machines, no obligation . . . and there is a qualified Baker Sales and Service Representative nearby who is eager to give you prompt and efficient service.

BAKER BROTHERS, INC. Toledo, Ohio DRILLING ... TAPPING ... KEYSEATING and CONTOUR GRINDING MACHINES

MACHINERY, October, 1952-373

Pratt & Whitney, West Hartford 1, Conn.
Scherr, George, Co., Inc., 200 Larayette St.,
New York 12, N. Y.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett, The L. S., Co., Athol, Mass.
Turner Bros., Inc., 2625 Hilton Rd., Ferndale
20, Mich.
Yon Keuren Co., 176 Waltham St., Waterton.

Van Keuren Co., 176 Waltham St., Watertown,

Noston, Moss.

Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

Woodworth, N. A., Co., 1300 E. Nine Mile Rd., Detroit 20, Mich.

#### GAGES, Surface

AGES, Surface

Ames, B. C., Co., Waltham 54, Mass.

Brown & Sharpe Mfg. Co., Providence, R. I.

Columbus Die-Tool & Mch. Co., 955 Cleveland

Ave., Columbus, Ohio.

DoAll Co., 254 Laurel Ave., Des Plaines, III.

Millers Falls Co., Greenfield, Mass.

Sheffield Corp., 721 Springfield, Dayton, Ohio.

Starrett, The L. S., Co., Athal, Mass.

Surface Checking Gage Co., 5864 Hollywood

Blvd., Hollywood 28, Calif.

#### GAGES, Toper

Brown & Sharpe Mfg. Co., Providence, R. I. DoAll Co., 254 Laurel Ave., Des Plaines, III. Engis Equipment Co., 431 S. Dearborn St., Chicago S. III. Pratt & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio. Starrett, The L. S., Co., Athol, Mass. Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

#### GAGES, Thread

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif. Bath, John, Co., Inc., Worcester, Mass. Detroit Tap & Tool Co., Detroit, Mich. DoAll Co., 254 Laurel Ave., Des Plaines, III. Federal Products Corp., P. O. Box 1027, Providence, R. I. Greenfield Tap & Die Corp., Greenfield, Mass. Pratt & Whitney, West Hartford 1, Conn. Sheffled Corp., 721 Springfield, Dayton, Ohio. Taft-Peirce Mfg. Co., Woonsocket, R. I.

Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich. Joseph N. A., Co., 1300 E. Nine Mile Rd., Detroit 20, Mich.

#### GASKETS

Garlock Packing Co., Palmyra, N. Y.

#### GEAR BLANKS, Non-Metallic

Braun Gear Co., 239 Richmond, Brooklyn 8, N. Y. General Electric Co., Schenectady 5, N. Y.

#### GEAR BURNISHING MACHINES

Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. Sheffield Corp., 721 Springfield, Dayton, Ohio.

#### GEAR CHAMFERING, ROUNDING AND BURRING MACHINES

Bilgram Gear & Mch. Warks, 1217-35 Spring Garden St., Philadelphia, Pa. Consolidated Mch. Tool Corp., Rochester, N. Y. Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Lipe-Rollway Corp., 806 Emerson Ave., Syra-cuse, N. Y. Orban, Kurt, Co., 205 E. 42nd St., New York 17, N. Y. Sheffield Corp., 721 Springfield, Dayton, Ohio.

#### GEAR CHECKING INSTRUMENTS AND EQUIPMENT

Brown & Sharpe MR, Co., Providence, R. I.
Eastman Kodak Co., Rochester, N. Y.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Gleason Works, 1000 University Ave., Rochester
3, N. Y.
Michigan Tool Co., 7173 E. McNichols Rd.,
Detroit 12, Mich.
National Broach & Mch. Co., 5600 St. Jean
Ave., Detroit 2, Mich.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Starrett, The L. S., Co., Athol, Mass.
Vinco Corp., 8855 Schaefer Highway, Detroit
27, Mich.

#### GEAR CUTTING MACHINES, Bevel Georg

Bilgram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa. Gleason Works, 1000 University Ave., Rochester 3, N. Y.

#### GEAR CUTTING MACHINES, **Bevel Gears, Spiral**

Gleason Works, 1000 University Ave., Rochester 3, N. Y.

#### GEAR CUTTING MACHINES, Spur and **Bevel Gears (Rotary Cutter)**

Waltham Machine Works, Newton St., Wal-tham, Mass.

#### GEAR CUTTING MACHINES, Spur and Helical Gears (Hobbing)

Barber-Colman Co., Rock and Montague, Rock-Barber-Colman Co., Rock and Montague, Rockford, III.
Hamilton Tool Co., 834 South 9th St., Hamilton, Ohio.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.
Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y.

#### GEAR CUTTING MACHINES, Spur and Helical Gears (Shaper or Planer Type)

Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.
Fellows Gear Shaper Co., 78 River St., Spring-field, Vt.
Kelvin Systems Corp., 135 Front St., New York 5, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
National Tool Co., 11200 Madison Ave., Cleve-land, Ohio.

#### GEAR CUTTING MACHINES, Worm and Worm Wheels

Barber-Colman Co., Rock and Montague, Rock-Barber-Colman Co., Rock and Montague, Rock-ford, III.
Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. (Straight and Hourglass Types).
Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.

#### GEAR FINISHING MACHINES

Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. National Broach & Mch. Co., 5600 St. Jean Trield, VT.
National Broach & Mch. Co., 5600 St. Jean
Ave., Detroit 2, Mich.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit 12, Mich.

#### GEAR GRINDING MACHINES

Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N. Y.
Gleason Works, 1000 University Ave., Rochester
3, N. Y.
National Broach & Mch. Co., 5600 St. Jean
Ave., Detroit 2, Mich.
National Tool Co., 11200 Madison Ave.,
Cleveland, Ohio.
Prott & Whitney, West Hartford 1, Conn.
Vinco Corp., 8855 Schaefer Highway, Detroit
27, Mich.

#### GEAR HARDENING MACHINES

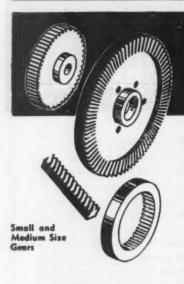
Gleason Works, 1000 University Ave., Rochester 3, N. Y.

#### GEAR LAPPING MACHINES

Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. Gleason Works, 1000 University Ave., Rochester 3, N. Y. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.

#### **GEAR MOTORS**

See Speed Reducers. (Continued on page 376)



PRECISION GEARS for YOUR individual requirements....

#### produced promptly to specifications

The "Mass Gear" organization specializes in gear design and production. Its facilities can be your Gear Department making it unnecessary for you to equip your shop with special gear-production machinery. You'll find it highly economical and most satisfactory to place your requirements in the hands of "Mass Gear."

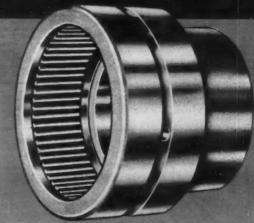
You specify—"Mass Gear" will produce the gear, the worm, the pinion-in any machinable material — to meet your conditions of application and service.

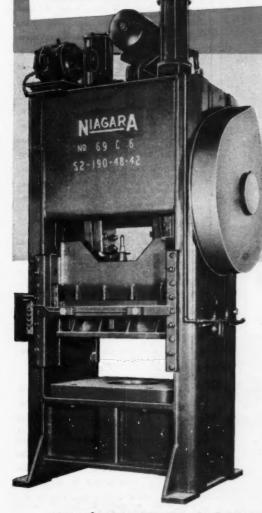
Massachusetts Gear & Tool Co. WOBURN, MASS.

## ORANGE ROLLER BUSHINGS

—meet operating requirements on intermediate shafts of

190 TON NIAGARA POWER PRESSES





This latest 190-ton model Niagara Power Press embodies many advances, including one-piece welded steel frame—enclosed gearing—air actuated, electrically controlled clutch—automatic lubrication—air counterbalanced slide. Among the improvements, Niagara engineers specified Orange Roller Bushings for precision, anti-friction operation of the intermediate shafts, based on 8 years of satisfactory service in other installations.

Wherever your designs call for needle bearings, give your product the advantages of Orange Roller Bushings. First, get exceptionally high load-carrying capacity in small space, to keep your designs compact. Second, give your equipment smooth, quiet, trouble-free operation for the life of your equipment.

Orange Roller Bushings are compact, heavy-duty, precision needle bearings having rigidly controlled internal clearances that minimize possibility of misalignment while running. Made of finest bearing steel—throughground—and finished to extremely high standards. Available in full range of sizes, from ½" to 8" shaft diameters. Engineering representatives in every industrial area invite discusion of your bearing problems, without obligation.

Write for Engineering Data Book showing design, sizes, capacities, installation data, etc.

ORANGE ROLLER BEARING CO., Inc. 552 Main St., Orange, N. J.

#### GEAR SHAVING MACHINES

Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.

#### GEAR TESTING MACHINERY

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. Brown & Sharpe Mfg. Co., Providence, R. I. Eastman Kodak Co., Rochester, N. Y. Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn. Fellows Gear Shaper Co., 78 River St., Springfield, Vf. K., Gleason Works, 1000 University Ave., Rochester 3, N. Y. Michigan Taol Co., 7171 E. McNichols Rd., Detroit 12, Mich. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich. Baldwin-Lima-Hamilton Corp., Philadelphia

National Tool Co., 11200 Madison Ave., Cleveland, Ohio. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

#### GEARS, Cut

GEARS, Cut

American Stock Gear Div., Perfection Gear
Co., Harvey, III.

Atlantic Gear Works, Inc., 200 Lafayette St.,
New York 12, N. Y.

Automotive Gear Works, Inc., Richmond, Ind.
Baush Machine Tool Co., 156 Wason Ave.,
Springfield 7, Mass.
Bilgram Gear & Mch. Works, 1217-35 Spring
Garden St., Philadelphia, Pa.
Boston Gear Works, 3200 Main St., North
Quincy, Mass.
Brad Foote Gear Works, 1309 S. Cicero Ave.,
Cicero 50, III.
Braun Gear Co., 239 Richmond, Brooklyn 8,
N, Y,
Cincinnati Gear Co., Wooster, Pike and
Mariemont Aves., Cincinnati, Ohio.
Cleveland Worm & Gear Co., 3249 E. 80th St.,
Cleveland, Ohio.

Cone-Drive Gears Div., Michigan Tool Co., 7200 E. McNichols Rd., Detroit, Mich. Diefendorf Gear Corp., 920 N. Beldon Ave., Syracuse, N. Y. Earle Gear & Mch. Co., 4707 Stenton Ave., Wayne Junction, Philadelphia 44, Pa. Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.
Gear Specialties, Inc., 2635 W. Medill Ave., Chicago 47, Ill.
Gleason Works, 1000 University Ave., Rochester 3, N. Y.
Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Illinois Gear & Mch. Co., 2120 No. Natchez Ave., Chicago 35, Ill.
Mass. Gear & Tool Co., 36 Nassau St., Woburn, Mass.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.
Derkins Mch. & Gear Co., Box 1611, Springfield 2, Mass.
Philadelphia Gear Works, Erie Ave. and G St., Philadelphia CS., Pa.

#### GEARS, Rawhide and Non-Metallic

American Stock Gear Div., Perfection Gear Co., Harvey, III.
Atlantic Gear Works, Inc., 200 Lafayette St., New York 12. N. Y.
Boston Gear Works, 3200 Main St., North Quincy, Mass.
Braun Gear Co., 239 Richmond, Brooklyn 8, N. Y.

N. Y.
Cincinnati Gear Co., Waoster, Pike and Mariemont Aves., Cincinnati, Ohio.
Diefendorf Gear Corp., 920 N. Beldon Ave., Syracuse, N. Y.
Earle Gear & Mch. Co., 4707 Stenton Ave., Wayne Junction, Philadelphia 44, Pa.
Gear Specialties, Inc., 2635 W. Medill Ave., Chicago 47, Ill.
Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.
Hartford, Conn.
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.
Philadelphia Gear Works, Erie Ave. and G St.

Ohio.
Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa.
Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 14, Ohio.
Williamson Gear & Machine Co., 2606 Martha St., Philadelphia 25, Pa.

#### **GENERATORS, Electric**

General Electric Co., Schenectady 5, N. Y. Lincoln Electric Co., (Arc) 22801 St. Clair Ave., Cleveland, Ohio. Reliance Elec. & Engrg. Co., Collinwood Sta., 1088 Ivanhoe Rd., Cleveland, Ohio.

#### GOGGLES

American Optical Co., Southbridge, Mass.

#### GRADUATING MACHINES

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I. Gorton, Geo., Mich. Co., 1110 W. 13th St., Racine, Wis. Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.

#### GREASE

GREASE
Cities Service Oil Co., 70 Pine St., New York, N. Y.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
Lubriplate Div., Fiske Bros. Refining Co., 129
Lockwood St., Newark S, N. J.
Pure Oil Co., 35 E. Wacker Drive, Chicago, Ill.
Shell Oil Co., 50 West 50th St., New York, N. Y.
Sinclair Refining Co., 630 5th Ave., New York, N. Y.
Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, Ill.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Texas Co., 135 E. 42nd St, New York, N. Y.
Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y.

#### GRINDERS, Carbide Tool

Cosa Corp., 405 Lexington Ave., New York 17, N. Y. elta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. (Continued on page 381)



1619 DOUGLAS AVENUE

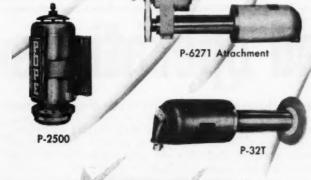
SEE US AT BOOTH 1130 - NATIONAL METAL EXPOSITION

Hammond Machinery Builders

KALAMAZOO, MICHIGAN

## IT'S THE SPINDLE THAT DOES THE WORK







Both the QUALITY and the
QUANTITY of a machine's production
largely depends on the SPINDLE.
For trouble-free operation and
continuous production of accurate
parts Specify POPE SPINDLES.

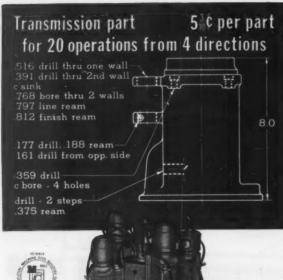
No. 8

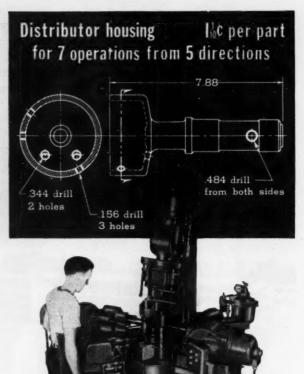
Specify POPE

POPE MACHINERY CORPORATION

Established 1398

MI RIVER STREET . HAVERHILL MASSACHUSETTS







200 PARTS AN HOUR GROSS. This 40-inch Auto-Index has twelve units - three horizontal and radial for the .375 hole, three horizontal and tangent to the index table for the .188 and .161 holes, and six vertical on the central column for the others.

300 PARTS AN HOUR GROSS. This man watches the machine clamp the part, do all operations at the same time and unclamp. Then he will change parts and trip a lever to repeat that cycle. There is no indexing. Bushings in the fixture guide all tools.

## ow combined operation

Special-purpose high-production machines do thousands of operations per man-hour with almost no scrap loss

Dear Sir:

Combined operations cut unit costs because there is -

- almost no scrap loss,
- less handling of parts,
- less floor space.

But the big reason is this: more output per man-hour. One machine and one operator do thousands of operations per hour. The operator just changes parts in the fixtures. Each part needs just one chucking for all the operations shown.

Automatic drilling and tapping units of 1/2 to 5 hp each operate the

tools. Each unit is compact and self-contained. Each has its own motor drive, its own speed and cam feed controls. Units may be at angles, horizontal or vertical.

#### All at the same time

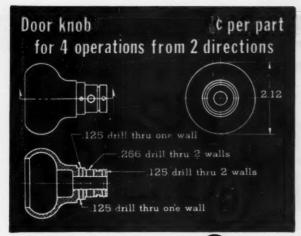
All units operate at the same time. On the Distributor Housing machine all units operate on the same part at the same time, and then the operator changes parts. The other three machines have index tables that hold a number of duplicate work fixtures. While the operator changes parts at space with fewer machines.

the loading station, the units operate on the parts at the working stations. The table then indexes to present each part to the next station. Each time the table indexes, another part

Naturally we cut the time cycle to the very minimum. The longest single operation determines this cycle. Each fixture can be unloaded and loaded in that time; if necessary, clamping, unclamping and sometimes ejection can be automatic.

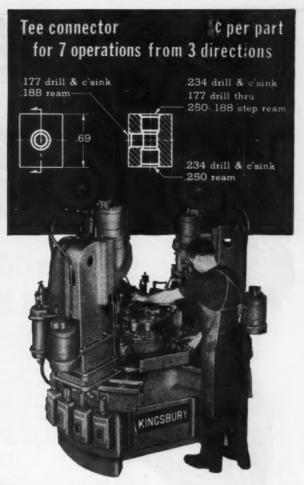
That, in a rather big nutshell, is how Kingsburys increase output per man-hour. It is the big saving.

Other savings: in handling with fewer chuckings of the work, in floor





630 PARTS AN HOUR GROSS. This Kingsbury is fairly simple—five fixtures on a 20-inch index table and four horizontal units. Our customer specified that one hole be drilled from both ends, so one unit reaches across the machine and drills from the rear.



680 PARTS AN HOUR GROSS. A 20-inch power index table has six fixtures. Three vertical units do the .250-.188 hole and control the feed of two undermeath spindles for the .250 hole, so there is no tool clash. Two horizontal units do the .188 hole.

## cut drilling, tapping costs

#### Almost no scrap loss

Naturally, your scrap loss affects your costs. For the lowest cost, all parts should gage perfectly.

We locate spindles to exact indicator readings and use precision ball bearings. Bushings guide drills and reamers to close tolerances.

Operations are in perfect relation with one another, because each part remains undisturbed in its fixture until the operation is completed.

Each unit that operates on the part has an automatic work cycle with a cam feed that does not vary.

All work fixtures and index tables are jig-bored to minimum tool room tolerances, so there is no deviation between any fixtures or in their location on the index table.

Before we ship your machine you may check the test samples and production rate. As one of our customer's men said to his companion after gaging a few samples, "Clyde, your troubles are over."

Sincerely, Kingsbury Machine Tool Corp. 98 Laurel St., Keene, N. H.

#### Each unit cost on the drawings

includes the cost of the man and of the machine - no power or overhead. We assumed:

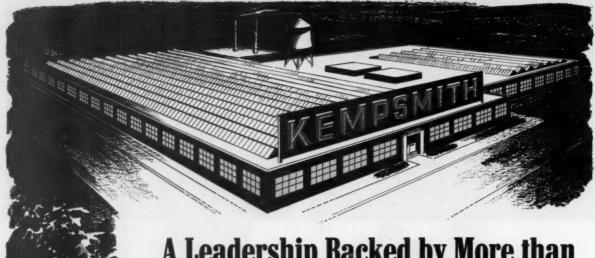
Unit cost of the man equal to: average U.S. hourly wage hourly gross × 80% efficiency

Unit cost of the machine to be: price of machine and tooling output in 6000 hrs. @ 80% eff.

KINGSBURY

AUTOMATIC DRILLING & TAPPING MACHINES

for Low-Cost High Production



#### A Leadership Backed by More than 64 Years of Milling Machine History

Back in 1888, Kempsmith Engineers developed and produced the first Kempsmith Miller — a machine that was destined to achieve world-wide fame. The successful performance of this early model encouraged important engineering improvements and refinements resulting in much greater speed and precision in milling operations. Today, Kempsmith continues as a leader in the industry. The ruggedness, precision and ability to take heavy cuts smoothly make Kempsmith Milling Machines ideal for production, toolroom or general purpose milling. If you have a milling problem, consult Kempsmith. Our engineers will gladly give you the benefit of their broad experience in this specialized field.

THE KEMPSMITH MACHINE CO.



Kempsmith Type "G" Plain Miller, All geared for positive power and smooth cutting, free from chatter. Note rugged, streamlined appearance. All controls are grouped within easy reach of the operator.

Let the chips fly! Kempsmith Millers have what it takes for tough production battles — built-in ruggedness, increased range of speeds and feeds, greater power. Every machine is precision-built, the product of 64 years of milling machine experience.



KEMPSMITH

Procession Built Milling Machines Pince 1888

DoAll Co., 254 Laurel Ave., Des Plaines, III, Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich. Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.

Adrian, Mich. Orban, Kurt, Co., 205 E. 42nd St., New York 17, N. Y.

#### GRINDERS, Die and Mold

Consolidated Mch. Tool Corp., Rochester, N. Y. Dumore Co., 1300 17th St., Racine, Wis. Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kolamazoo 54, Mich. Pratt & Whitney, West Hartford 1, Conn. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

#### GRINDERS, Oilstone, for Woodworking Tools

Mummert-Dixon Co., Hanover, Pa.

#### **GRINDERS**, Pneumatic

Chicago Preymatic Tool Co., 6 E. 44th St., New York, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J. Madison-Kipp Corp., Madison, Wis. Onsrud Machine Works, Inc., 3940 Palmer St.,

#### **GRINDERS, Portable Electric and Toolpost**

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md. Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md. Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Dumore Co., 1300 17th St., Racine, Wis. Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich. Millers Falls Co., Greenfield, Mass. Skil Corp., 5039 Elston Ave., Chicago, III.

#### GRINDING FIXTURES

Geometric Tool Co. (Die Chaser), Westville Station, New Haven 15, Conn. Madison Mfg. Co., Muskegon Heights, Mich.

#### GRINDING MACHINES, Abrosive Belt

Delta Power Tool Div., Rockwell Mfg. Co. 614G N. Lexington Ave., Pittsburgh 8, Pa Ex-Cell-O Corp., 1200 Oakman Blvd., Detroi -Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. II Acme Co., 1201 W. 65th St., Cleveland 2, Ohia.

Mattison Mch. Works, Rockford, III.
Mead Specialties Co., 4114 North Knox Ave.,
Chicago 41, III.
Porter-Cable Mch. Co., Salina St., Syracuse,
New York.
Walker-Turner Div., Kearney & Trecker Corp.,
South Ave., Plainfield, N. J.
Walls Sales Corp., 333 Nassau Ave., BrookIyn 22, N. Y.

#### GRINDING MACHINES, Bench

GRINDING MACHINES, Bench

Atlas Press Co., 1253 N. Pitcher Ave., Kalamazoo, Mich.

Black & Decker Mfg. Co., E. Penna. Ave.,
Towson, Md.

Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh 8, Po.,
Gorton, Geo., Mch. Co., 1110 W. 13th St.,
Racine, Wis.

Hammond Machinery Builders, Inc., 1600
Douglas Ave., Kalamazoo 54, Mich.
Hardinge Bros., Inc., 1418 College Ave.,
Elmira, N. Y.

Millers Folis Co., Greenfield, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.

Ryerson, Jos. T., & Son, Inc., 2558 W. 16th
St., Chicago 18, III.

Walker-Turner Div., Kearney & Trecker Corp.,
South Ave., Plainfield, N. J.

#### GRINDING MACHINES, Broach

Colonial Broach Co., Detroit 13, Mich. Lapointe Mch. Tool Co., 34 Tower St., Hud-son, Mass.

#### GRINDING MACHINES, Comshaft

Landis Tool Co., Waynesboro, Pa. Norton Co., 1 New Bond St., Worcester 6,

#### GRINDING MACHINES, Corbide Tool

Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass. Carboloy Dent., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.

Oliver Instrument Co., 1410 E. Maumee St.,

Adrian Mich Orbon, Kurt, Co., 205 E. 42nd St., New York

17, N. Y. Sheffield Corp., 721 Springfield, Dayton, Ohio. Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

#### **GRINDING MACHINES, Centerless**

Cincinnati Grinders, Inc., Cincinnati, Ohio.
Diversified Metal Products Co., 5125 Alcoa
Ave., Los Angeles 58, Calif.
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.
Landis Tool Co., Inc., Waynesboro, Pa. Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y.

GRINDING MACHINES, Chucking

Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt. Landis Tool Co., Inc., Waynesboro, Pa.

#### GRINDING MACHINES, Crankshaft

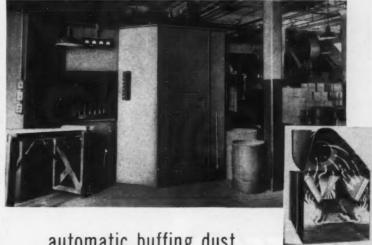
Landis Tool Co., Waynesboro, Pa. Norton Co., I New Bond St., Worcester 6, Mass.

#### GRINDING MACHINES, Cylindrical

Arter Grinding Mch. Co., 15 Sagamere Rd., Worcester 5, Mass. Brown & Sharpe Mfg. Co., Providence, R. I. Cincinnati Grinders, Inc., Cincinnati, Ohio. Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N. Y.
DoAll Co., 254 Laurel Ave., Des Plaines, III,
Dumore Co., 1300 17th St., Racine, Wis.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.

(Continued on page 382)

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#### automatic buffing dust

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Buffing dust has individual characteristics that create a special problem. It is composed mainly of linty particles from buffing wheels which are often impregnated with sticky compounds. Automatic buffing produces this dust in quantities and its sticky nature makes it both difficult to control or to efficiently exhaust by ordinary methods. However, a large arms manufacturer is one of many concerns which has successfully solved this problem with AAF Type N ROTO-CLONES. The Type N ROTO-CLONE is a

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Kelvin Systems Corp., 135 Front St., New York 5, N. Y. Landis Tool Co., Inc., Waynesboro, Pa. Norton Co., 1 New Bond St., Worcester 6, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y.

#### GRINDING MACHINES, Die Cheser

Eastern Mch. Screw Corp., New Haven, Conn. Landis Machine Co., Waynesboro, Pa.

#### GRINDING MACHINES, Disc

Besly-Welles Corp., Beloit, Wis. Gardner Machine Co., 414 E. Gardner St., Beloit, Wis. Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich. Mattison Machine Works, Rockford, III. Porter-Cable Machine Co., Salina St., Syracuse, N. Y.

#### GRINDING MACHINES, Drill

Blake, Edward, Co., 442 Cherry St., West Newton 65, Mass.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Gallmeyer & Livingston Co., 336 Straight Ave., S. W. Grand Rapids 4, Mich.
Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.
Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.
Orban, Kurt, Co., 205 E. 42nd St., New York 17, N. Y.
Union Twist Drill Co., Athol, Mass.

#### GRINDING MACHINES, Face

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N. Y.
Mattison Machine Works, Rockford, III.
Oliver Instrument Co., 1410 E. Maumee St.,
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#### **GRINDING MACHINES, Flexible Shaft**

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Cincinnati Grinders, Inc., Cincinnati, Ohio. Landis Tool Co., Waynesboro, Pa.

#### GRINDING MACHINES, Gear Tooth

See Gear Grinding Machines.

#### GRINDING MACHINES, For Shorpening Cutters, Reamers, Hobs, Etc. Barber-Colman Co., Rock and Montague, Rock-

Barber-Colman Co., Rock and Montague, Rockford, III.
Blake, Edward, Co., 442 Cherry St., West Newton 65, Mass.
British industries Corp., 164 Duane St., New York, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Mch. Co., Cincinnati, Ohio.
Cosa Corp., 405 Lexington Ave, New York 17, N. Y.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Gallmeyer & Livingston Co., 336 Straight Ave., S. W. Grand Rapids 4, Mich.
Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III.
Landis Tool Co., Waynesboro, Pc.
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Norton Co., 1 New Bond St., Worcester 6, Mass.
Oliver Instrument Co., 1410 E. Maumee St.,

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Adrian, Mich.
Onsrud Machine Works, Inc., 3940 Palmer St.,
Chiange IIII Chicago, III.
Pratt & Whitney, West Hartford 1, Conn.
Thompson Grinder Co., 1500 W. Main St.,
Springfield, Ohio.
Union Twist Drill Co., Athol, Mass.

#### **GRINDING MACHINES, For Sharpening Turning and Planing Tools**

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. (Continued on page 384)



#### WELDED DESIGN ALWAYS SAVES STEEL AND LOWERS COST



Fig.1-Original Construction-Base for processing machine. Weighed 67 pounds. Material Cost-\$15.05; Machining Cost-\$7.34. Total Cost \$22.39.



Fig. 2-Present Welded Steel Design - Stronger, more rigid. Weighs only 43 pounds. Material Cost \$2.50; Fabrication-\$9.77. Total Cost-\$12.27.

base (Fig. 2), lower weight with steel now saves on manate production bottlenecks in the shop. Components are Through welded steel, our shop now has better control its work schedule. We are no longer dependent on our better quality production with steel. As shown in the welded terial cost as well as in transportation charges. Welded steel can be fabricated with simpler skills, helping to elimipre-machined on light, fast machine tools prior to welding, saving time and cost of operating heavier shop equipment side sources for castings nor contend with storage and lower cost machine components because of

**BUILDS STRONGER MORE RIGID MACHINE BASE** 

... cuts weight 36%, lowers cost 45%

many of our

ELDED design has been adopted on

Gifford Wood Company, Hudson, New York By A. H. Hallenbeck, Plant Manager

as was the case with cast construction. Jo

cast designs. The product has a more modern appearance Welded design makes it possible to meet price compe-tition in our field that we were unable to do with the original maintenance of pattern equipment. to improve selling appeal.

Fig. 3 - Food processing machine for the Gifford Wood Company, Hudson, New York. Streamlined appearance is simple to main-tain, easy to clean.

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Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.
Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester S, Mass.
Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Dumore Co., 1300 17th St. N. Y.
Dumore Co., 1300 17th St., Racine, Wis.
Ex-Cell-O Corp., 1200 Oakman Bivd., Detroit
32, Mich.
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.

Neise, Karl A., Dept, M, 381 Fourth Ave., New York 16, N. Y. Orban, Kurt, Co., 205 E. 42nd St., New York 17, N. Y. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass. Wicaco Machine Corp., Stenton Ave. and Lou-den St., Philadelphia, Pa.

#### GRINDING MACHINES, Jig

Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn. Pratt & Whitney, West Hartford 1, Conn.

#### GRINDING MACHINES, Knife and Shear

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I. Hanchett Mfg. Co., Big Rapids, Mich. Hill Acme Co., 1201 W. 65th St., Cleveland 2, Mattison Machine Works, Rockford, III.

#### **GRINDING MACHINES, Piston Ring**

Gardner Machine Co., 414 E. Gardner St., Beloit, Wis. Heald Machine Co., 10 New Bond St., Worcester 6, Mass. Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo. Mattison Machine Works, Rockford, III.

#### GRINDING MACHINES, Profile

Cleveland Grinding Machine Co., 1643 Eddy Rd., Cleveland 12, Ohio. Cosa Corp., 405 Lexington Ave., New York 17, Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Orban, Kurt, Co., 205 E. 42nd St., New York
17, N. Y.
Sheffield Corp., 721 Springfield, Dayton, Ohio.

#### GRINDING MACHINES, Radial, Ball Race, Etc.

Landis Tool Co., Waynesboro, Pa.

#### GRINDING MACHINES, Radius, Link

Consolidated Mch. Tool Corp., Rochester, N. Y. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

#### **GRINDING MACHINES, Ring Wheel**

Besly-Welles Corp., Beloit, Wis.
Gardner Machine Co., 414 E. Gardner St., Beloit, Wis. Wis. Mattison Machine Works, Rockford, III. Standard Electrical Tool Co., 2500 River Rd., Cincinnati 4, Ohio.

#### GRINDING MACHINES, Roll

Farrel-Birmingham Co., 25 Main St., Ansonia, Conn. Landis Tool Co., Waynesboro, Pa. Norton Co., 1 New Bond St., Worcester 6, Mass.

#### **GRINDING MACHINES, Spline Shaft**

Kelvin System Corp., 135 Front St., New York 5, N. Y.

#### GRINDING MACHINES, Surface

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.
Arter Grinding Mch. Co., 15 Sagamore Rd.,
Worcester 5, Mass.
Blanchard Machine Co., 64 State St., Cam-Blanchard Machine Co., 64 State St., Cambridge, Mass.
Pritish Industries Corp., International Machinery Div., 164 Duane St., New York, N. Y.
Brown & Sharpe Mf., Co., Providence, R. I.
Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh & Po.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Gallmeyer & Livingston Co., 336 Straight Ave.,
5.W., Grand Rapids 4, Mich.
Gardner Machine Co., 414 E. Gardner St.,
Beloit, Wis.
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.
Hill Acme Co., 1201 W. 65th St., Cleveland 2,
Ohio. Mattison Machine Works, Rockford, III. Norton Co., 1 New Bond St., Worcester 6, Mass. Mass.
Orban, Kurt, Co., 205 E. 42nd St., New York
17, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Reid Bros. Co., Inc., Beverly, Mass.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Standard Electrical Tool Co., 2500 River Rd.,
Cincinnati 4, Ohio.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Thompson Grinder Co., 1500 W. Main St.,
Springfield, Ohio. Springfield, Ohio. Walker, O. S., Co., Inc., Worcester, Mass.

#### GRINDING MACHINES, Top

Blake, Edward, Co., 442 Cherry St., West New-ton 65, Mass. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.

#### GRINDING MACHINES, Thread

Dumore Co., 1300 17th St., Racine, Wis. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.
Londis Machine Co. (Centerless), Waynesboro, Pa.

(Continued on page 386)



#### EASY MOVING PIVOT-JOINTED WORK TABLE

The special pivot-jointed parallelogram construction of the work table permits the operator to pass the tool across the face of the wheel in long or short even strokes. This action, similar to honing, results in a fine polished surface.

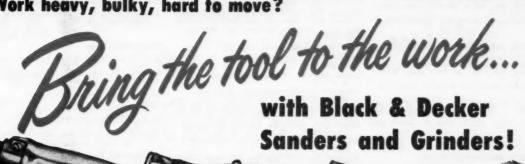
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#### GRINDING MACHINES, Universal

Brown & Sharpe Mfg. Co., Providence, R. I. Cincinnati Grinders, Inc., Cincinnati, Ohio. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y. Kelvin Systems Corp., 135 Front St., New York 5, N. Y. S, N. Y.
Landis Tool Co., Waynesboro, Pa.
Norton Co., 1 New Bond St., Worcester 6,
Mass.
Orban, Kurt, Co., 205 E. 42nd St., New York
17, N. Y.

#### GRINDING MACHINES, Worm

Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt. Pratt & Whitney, West Hartford 1, Conn.

#### GRINDING WHEELS

Bakelite Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y. Bay State Abrasive Products Co., Westboro,

Besly-Welles Corp., Beloit, Wis.

Blanchard Machine Co., 64 State St., Cambridge, Mass.

Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.

Cincinnati Milling Machine Co., Grinding Wheels Div. Cincinnati, Ohio.

Gardner Machine Co. (Surface Grinder), 414 E. Gardner St., Beloit, Wis.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.

Norton Co., I New Bond St., Worcester 6,

Precision Diamond Tool Co., 102 South Grove Ave., Elgin, III. (Diamond).

Simonds Abrasive Co., Tacony and Fraley Sts., Bridesburg, Philadelphia, Pa.

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Columbia Machinery & Engineering Corp.,

Hamilton 1, Ohio.

Morgan Engrg. Co., Alliance, Ohio.

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Chambersburg Engrg. Co., Chambersburg, Pa.

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#### **HAMMERS, Portable Electric**

Black & Decker Mfg. Co., E. Penna Ave., Towson, Md. Millers Falls Co., Greenfield, Mass.

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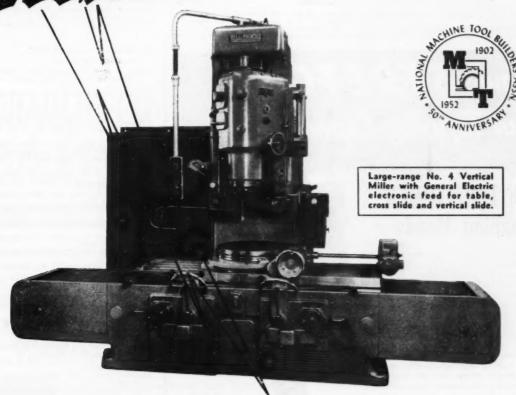
#### HOBS

Barber-Colman Co., Rock and Montague, Reck-ford, III. Brown & Sharpe Mfg. Co., Providence, R. I. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

(Continued on page 388)



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Chambersburg Engrg. Co., Chambersburg, Pa.
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.
Denison Engrg. Co., 1160 Dublin St., Columbus
16, Ohio.
Farquhar, A. B., Co., 21 Duke St., York, Pa.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Hill.
Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.
Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.
Watson-Stillman Co., Aldene Rd., Roselle, N. J.

Watson-Stillman Co., Aldene Rd., Roselle, N. J. Wilson, K. R., 215 Main St., Buffalo, N. Y.

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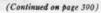
Barnes Drill Co., 814 Chestnut, Rockford, III.
Barnes, John S., Corp., Rockford, III.
Barnes, W. F. & John, Co., 201 S. Water St.,
Rockford, III.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

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Brown & Sharpe Mfg. Co., Providence, R. I.
Engis Equipment Co., 431 S. Dearborn St.,
Chicago S, Ill.
Hartford, Special Mchry. Co., 287 Homestead
St., Hartford, Conn.
Hirschmann, Carl., Co., 30 Park Ave., Manhasset, N. Y.
Kempsmith Machine Co., 1819 S. 71st St.,
Milwaukee 14, Wis.
Rockford, Ill.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.
Turner Bros., Inc., 2625 Hilton Rd., Ferndale
20, Mich.
Vinco Corp., 8855 Schaefer Highway, Detroit
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Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

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9-M-56

Billet Breaker

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Starrett, The L. S., Co., Athol, Mass.

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#### INDICATORS, Test

Ames, B. C., Co., Waltham 54, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Federal Products Corp., P. O. Box 1027, Providence, R. I.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett, The L. S., Co., Athol, Mass.

#### INDUCTION HEATING EQUIPMENT

General Electric Co., Schenectody, N. Y. Lepel High Frequency Laboratories, Inc., 55th St. and 37th Ave., Woodside 77, N. Y. Ohio Crankshaft Co., 3800 Harvard Ave., Cleveland, Ohio.

#### INTENSIFIERS, Hydraulic

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.
Farquhar, A. B., Co., 21 Duke St., York, Pa.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gilead, Ohio.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.

Morgan Engrg. Co., Alliance, Ohio. Watson-Stillman Co., Aldene Rd., Roselle, N. J.

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.

JIG BORER

See Boring Machines, Jig.

#### JIGS AND FIXTURES

Allied Products Corp., 12677 Burt Rd., Detroit 23, Mich.
Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.
Columbus Die-Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Ingersoll Milling Machine Co., 2442 Douglas St., Rockford, Ill.
Jahn, B., Manufacturing Co., Ellis St., New Britain, Conn.
Logansport Machine Co., Inc., Logansport, Ind.
Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill. Allied Products Corp., 12677 Burt Rd., Detroit

Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich. Woodworth, N. A., Co., 1300 E. Nine Mile Rd., Detroit 20, Mich.

JOINTS, See Fittings, Hydraulic,

Pneumatic, Etc.

#### KEYSEATERS

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Consolidated Mch. Tool Co., Rochester, N. Y. Davis Keyseater Co., 405 Exchange St., Rochester 8, N. Y. Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.

Mitts & Merrill, 68 Holden St., Saginaw, Mich.

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#### KNURLING TOOLS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Pratt & Whitney, West Hartford 1, Conn. Williams, J. H., & Co., 400 Vulcan St., Buffale 7, N. Y.

#### LAPPING MACHINES

Cincinnati Grinders, Inc. (Centerless), Cincinnati, Ohio.
Crane Packing Co., 1800 Cuyler Ave., Chicage, III. (Lapmaster Div.).
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.
Norton Co., 1 New Bond St., Worcester 6, Mass.

#### LATHE AND GRINDING DOGS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Williams, J. H., & Co., 400 Vulcan St., Buffele 7, N. Y.

#### LATHE ATTACHMENTS

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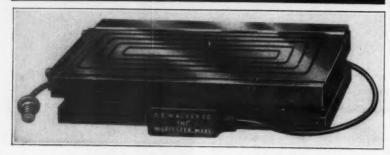
American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio.

Atlas Press Co., 1253 N. Pitcher St., Kalamazoo, Mich.
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio.
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.
Hendey Machine Co., Torrington, Conn.
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio.
Prott & Whitney, West Hartford I, Conn.
Reed-Prentice Corp., 677 Cambridge St., Warcaster, Mass. cester, Mass.

Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

(Continued on page 394)

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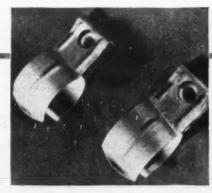
Your Shell Representative can give you more information about the "VPI" method of rust prevention. Call him today. Or write to nearest address listed below.

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3 weeks in an open box. The upper clip was first sprayed with 4% "VPI" solution. Note that the "VPI"-treated clip suffered none of the rusting which is apparent on the lower clip.



(a volatile

corrosion inhibitor)

stops air and moisture from making rust.

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#### Only Reid has all these:

- One piece cast iron base for maximum rigidity and freedom from vibration
- All mechanical units built around rugged one-piece column casting insure permanent alignment of cross-slide saddleways and vertical headways, mounted on independent base
- · Adjustable dust guard spout and wheel guard of new design
- Vernier for elevating hand wheel graduated to .0001" (optional)
- Ground thread cross feed and elevation for life-time precision
- Work table is annealed and stress-relieved with one V-way and one flat way; hand scraped for accuracy
- Power feed models feature a variable speed table control, from 12' to 35' per minute
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#### protect from dust!

Telescoping dust plates protect vertical mechanism and cross feed mechanisms.



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Cartridge type motorized spindle runs on pre-loaded roller bearings, with sealed-in lubrication; standard-size, and interchanged within minutes!

#### lessen fatigue!

All hand wheels are correctly positioned at operator's finger-tip level, decreasing fatigue, and adding to both operator's and machine's efficiency; increases productive capacity.

#### in full view!

Electrical controls (Model 618V) are mounted in the base, in full view, yet fully protected from dust by clear, transparent shatter-proof panel. (Full J.I.C. controls available for all models)

#### specifications

Capacity: 6"x18"x151/4"
Floor space: 70"x36"
Work table: 51"x8"
Standard wheel 7"x1/4"x11/4"
Weight: 2,000 lbs.,
crated 2,225 lbs.

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BEVERLY



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MACHINERY, October, 1952-393

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Sidney Machine Tool Co., Sidney, Ohio.
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.
Springfield Mch. Tool Co., Springfield, Ohio.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.
Turnomat Co., Inc., Brackport, N. Y.
Warner & Swasey Co., 5701 Carnegie Ave.,
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Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis. Goss & DeLeeuw Mch. Co., Kensington, Conn. Janes & Lamson Mch. Co., 160 Clinton St., Springfield, Vt. LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio. Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio. Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio. Notional Acme Co., 170 E. 131st St., Cleveland, Ohio. New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn. Potter-Cable Machine Co., Salina St., Syracuse, N. Y. Potter & Johnston Co., 1027 Newport Ave., Pawtucket, R. I. Pratt & Whitney, West Hartford 1, Conn. Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y. Seneca Falls Mch. Co., Seneca Falls, N. Y. Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

LATHES, Axle

Consolidated Mch. Tool Corp., Rochester, N. Y.
LeBlond, R. K., Mch. Tool Co., Madison and
Edwards Rds., Cincinnati 18, Ohio.
Seneca Falls Mch. Co., Seneca Falls, N. Y.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Sundstrand Mch. Tool Co., 2531 11th St.,
Rockford, III.

#### LATHES, Bench

LATHES, Bench

Ames Precision Mch. Works, Waltham, Mass.
Atlas Press Co., 1253 N. Pitcher St., Kalamazoo, Mich.
British Industries Corp., International Mchry.
Div., 164 Duane St., New York, N. Y.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Hardinge Bros., Inc., 1418 College Ave., Elmira, N. Y.
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohlo.
Pratt & Whitney, West Hartford 1, Conn.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Seneca Falls Mch. Co., Seneca Falls, N. Y.
Sheldon Mch. Co., Inc., 4240-4258 N. Knox
Ave., Chicago 41, Ill.
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.

#### LATHES, Boring

Bullard Co., Brewster St., Bridgeport 2, Conn.
Gisholt Machine Co., 1245 E. Washington Ave.,
Madison 10, Wis.
LeBlond, R. K., Mch. Tool Co., Madison and
Edwards Rds., Cincinnati 18, Ohio.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.
Sidney Machine Tool Co., Sidney, Ohio.

#### LATHES, Crankshaft

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#### LATHES, Double-End

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Consolidated Mch. Tool Corp., Rochester, N. Y. LeBland, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

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Monarch Machine Tool Co., 27 Oak St., Sidney,
Ohio.
Sidney Machine Tool Co., Sidney, Ohio.

#### LATHES, Engine and Toolroom

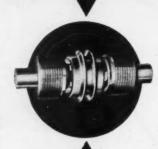
LATHES, Engine and Toolroom

American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio.
Atlas Press Co., 1233 N. Pitcher St., Kalamazoo, Mich.
Axelson Mrg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif.
Cincinnati Lathe & Tool Cy., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.
H. E. B. Mch. Tools, Inc., 341 Madison Ave., New York 17, N. Y.
Hendey Machine Co., Torrington, Conn.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.
Logan Engra. Co., 4901 W. Lawrence Ave., Chicanon 30. III. cinnati 25, Ohio. Logan Engrg. Co., 4901 W. Lawrence Ave., Chicago 30, III. Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio.

(Continued on page 396)

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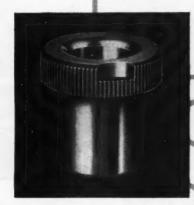
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Red-Prentice Corp., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Rockford Machine Tool Co., 2500 Kishwaukee Rockford Machine Tool Co., 2500 Kishwaukee

Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, III.
Seneca Falls Mch. Co., Seneca Falls, N. Y.
Sheldon Machine Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, III.
Sidney Machine Tool Co., Sidney, Ohio.
Simmons Machine Tool Corp., 1600 N. Broadway, Albany, N. Y.
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend Lathe Works, Inc., 425 E. Madison Springfield Mch. Tool Co., Springfield, Ohio.

#### LATHES, Gop

LATHES, Gep

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta. Los Angeles 58, Calif.
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio.
Gisholt Machine Co., 1245 E. Washington Ave., Madison 18, Wis.
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LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.
Nebel Machine Tool Co., 3401 Central Parkway, Cincinnati 25, Ohio.
Seneca Falls Mch. Co., Seneca Falls, N. Y.
Sidney Machine Tool Co., Sidney, Ohio.
Springfield Mch. Tool Co., Springfield, Ohio.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

#### LATHES, Gun

Consolidated Mch. Tool Corp., Rochester, N. Y. LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio. Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo. Seneca Falls Mch. Co., Seneca Falls, N. Y.

#### **LATHES, Hollow Spindle**

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif.
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

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#### LATHES, Spinning

Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ferracute Machine Co., Bridgeton, N. J.

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See Lathes, Engine and Toolroom,

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Div., 164 Duane St., New York, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Cosa Corp., 405 Lexington Ave., New York 17,
N. C

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Hardinge Brothers, Inc. (Bench or Cabinet
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Hirschmann, Carl, Co., 30 Park Ave., Man
hasset, N. Y.
Jones & Lamson Mch. Co., 160 Clinton St.,
Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Madison and
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Lodge & Shipley Co., 3055 Colerain Ave.,
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(Continued on page 400)



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The Torrington Swager operates on the same principle-delivering 4000 hammer blows a minute. It reduces,

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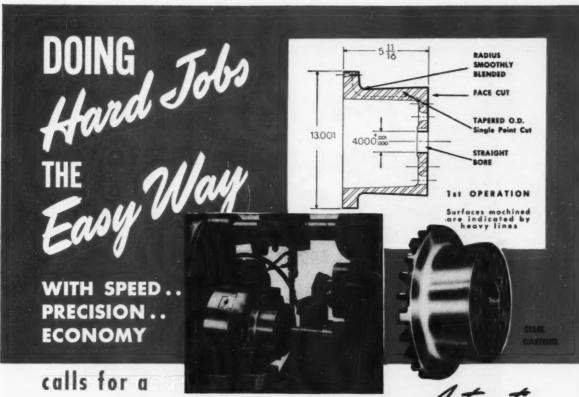
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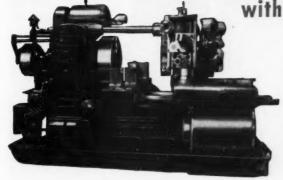
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Skillful P & J Tooling on the powerful P & J 6-DRE Automatic is a combination that adds up to increased output with high precision and lower production and labor costs on every type of work. In the set-up for the steel casting job shown above, the overhead pilot bar is equipped with a cam that operates a slide tool on the turret to obtain the angle with a single-point cut.

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Ask Lukens' production people how they like this Baldwin press. They'll tell you about versatility-the ease of operation-the open design that makes it easy to reach every part-the simplicity of maintenance.

An outstanding feature, they report, is the exceptional rigidity. There's no distortion under tough jobs. Which, of course, pleases the press operators, for they can more easily hold close tolerances.

Like most large Baldwin presses, this 2000-tonner represents a combination of our ideas and those of Lukens' experts. This is typical of the way we blend our design experience with that of customers' to come up with better presses.

and explains why most of the large flanging presses produced each year are Baldwin-built.

Because of their rigidity-and other outstanding features-you'll find a lot of Baldwin hydraulic presses in the Lukens' shops.

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- Baldwin bending roll
- Baldwin 125-ton gap press
- Baldwin 36' plate planer to bevel steel plate prior to welding
- · Baldwin 75-ton press for flattening ring

The Baldwin 2000-ton press has a moving-down platen operated by two 40-inch rams and carries a 40-inch, 1000-ton double-acting center ram. A stripping cylinder is mounted inside the bottom platen with a 600-ton cushioning cylinder located below.

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Potter & Johnston Co. (Automatic), 1027 Newport Ave., Pawtucket, R. I.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.
South Bend, Lathe Works, 425 E. Madison St., South Bend, Ind.

South Bend, Ind. Springfield Mch. Tool Co., Springfield, Ohio. Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

#### LATHES, Vertical Turret

American Steel Foundries, King Mch. Tool Div., Paddock Rd. and Tennessee Ave., Cincin-Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.
Bullard Co., Brewster St., Bridgeport 2. Conn.
Lehmann, J. M., Co., Inc., 55 New York Ave.,
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Orban, Kurt, Co., 205 E. 42nd St., New York
17, N. Y.
Rogers Machine Works, Inc., Buffalo 10, N. Y.

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Pure Oil Co., 35 E. Wacker Driver, Chicago, III.
Shell Oil Co., 50 West 50th St., New York,
St. Color, St. C Sinclair Refining Co., 630 5th Ave., New York, N. Y. Standard Oil Co. (Indiana), 910 S. Michigan, Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, III. Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St., Chicago 23, III. Sun Oil Co., 1608 Walnut St., Philadelphia, Pa. Texas Co., 135 E. 42nd St., New York, N. Y. Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y.

#### LUBRICATING SYSTEMS

Bowser, Inc., 1365 E. Creighton Ave., Fort Wayne, Ind. Farval Corp., 3249 E. 80th St., Cleveland, Ohio. Madison-Kipp Corp., Madison, Wis. Onsrud Machine Works, Inc., 3940 Palmer St., Chicaron. III Chicago, III.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

#### MACHINISTS' SMALL TOOLS

See Calipers, Hammers, Wrenches, Drills, Tap, Etc.

#### MANDRELS

See Arbors and Mandrels.

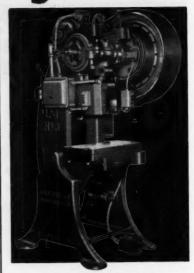
#### MARKING MACHINES AND DEVICES

Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.

#### MEASURING MACHINES AND INSTRUMENTS, PRECISION

INSTRUMENTS, PRECISION
Federal Products Corp., P. O. Box 1027, Providence, R. I.
Neise, Karl A., Dept, M., 381 Fourth Ave.,
New York 16, N. Y.
Norma-Hoffmann Bearings Corp., Stamford,
Conn.
Pratt & Whitney, West Hartford 1, Conn.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Sheffield Cerp., 721 Springfield, Dayton, Ohio.
Starrett, The L. S., Co., Athol, Mass.
Van Keuren Co., 176 Waltham St., Watertown,
Boston, Mass.
Vinco Corp., 8855 Schaefer Highway, Detroit
27, Mich.

(Continued on page 402)



#### with Air Clutches for Higher Productivity

Higher speeds plus rigidity and accuracy give L&J Presses their outstanding performance. Put these dependable O.B.I. presses to work and you'll see output climb. Tolerances will meet exacting specifications—dies will last longer and only a minimum of routine maintenance will be needed.

L & J Presses are made in 12 O.B.I. models—back geared and plain flywheel types—and 8 sizes from 6 to 80 ton capacities.

Write for Literature

#### SPECIFICATIONS

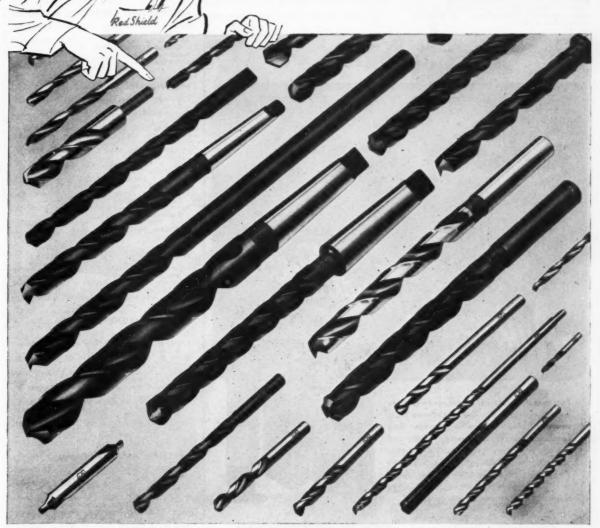
No. 3 Plain Flywheel Press with L&J-Fawick Air Clutch (Illustrated)

Includes single stroke inching and continuous running. Also variable speed and automatic lubrication. 22 ton capacity, 21/2" standard stroke, 814" or 1014" die space (bed to slide, stroke down, adjustment up), 214" x 124" bolster plate area L. to R. x F. to B., 6%" throat depth, 10" opening through back, 2,250 pounds net weight.



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"Cure production ills with STANDARD DRILLS"



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#### **METAL**, Bearings

See Bearings, Bronze, Babbitt, Etc., and Bushings, Brass, Bronze, Etc.

#### METERS

See Recording Instruments.

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Ames, B. C., Co. (Dial), Waltham 54, Mass. Bath, John, Co., Inc., Worcester, Mass. Brown & Sharpe Mfg. Co., Providence, R. I. Inter-Continental Trading Corp., 90 West 5t., New York 6, N. Y.

Millers Falls Co., Greenfield, Mass.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Starrett, The L. S., Co., Athol, Mass.
Yan Keuren Co., 176 Waltham St., Watertown,
Baston, Mass.

#### MICROSCOPES, Toolmakers

Engis Equipment Co., 431 S. Dearborn St., Chicago 5, III. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

#### MILLING ATTACHMENTS

Brown & Sharpe Mfg. Co., Providence, R. I. Cincinnati Milling Machine Co., Cincinnati, Ohio. Consolidated Machine Tool Corp., Rochester, N. Y.

-)pecial

Gorton, George Mch. Co., 1110 W. 13th St., Racine, Wis. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill. Rockford, III.
Kearney & Trecker Corp., Milwaukee, Wis.
Kempsmith Machine Co., 1819 S. 71st St.,
Milwaukee 14, Wis.
Northwestern Tool & Engrg. Co., 117 Hollier,
Dayton, Ohio
Porter-Cable Machine Co, Salina St., Syracuse,

N. Y.
Prott & Whitney, West Hartford 1, Conn.
Reed-Prentice Corp., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.
Sundstrand Mch. Tool Co., 2531 11th St.,
Rockford, III.
Van Keuren Co., 176 Waltham St., Watertown,
Boston, Mass. Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass. Van Norman Co., 3640 Main St., Springfield 7,

#### MILLING AND CENTERING MACHINES

Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis. Jones & Lamson Mch. Co. (Automatic), 160 Clinton St., Springfield, Vt. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

#### MILLING MACHINES, Automatic

Cincinnati Milling Machine Co., Cincinnati, Cincinnati Milling Machine Co., Cincinnati, Ohio.
Consolidated Machine Tool Corp., Rochester, N. Y.
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.
Janes & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.
Kearney & Trecker Corp., Milwaukee, Wis.
Pratt & Whitney, West Hartford 1, Conn.
Snyder Tool & Engineering Co., 3400 East Lafayette, Detroit 7, Mich.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J. Ohio. onsolidated Machine Tool Corp., Rochester,

#### MILLING MACHINES, Bench

Atlas Press Co., 1253 N. Pitcher St., Kalama-zoo, Mich. Hardinge Bros., Inc. (Bench or Pedestal Type), 1418 College Ave., Elmira, N. Y. Pratt & Whitney, West Hartford 1, Conn.

#### MILLING MACHINES, Circular Continuous

Consolidated Machine Tool Corp., Rochester, Consolidated Machine Tool Corp., Rochester, N. Y.
Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.
Espen-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.
Ingersoll Milling Mch. Co., 2442 Douglas St..
Rockford, III.
Kearney & Trecker Corp., Milwaukee, Wis.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

#### MILLING MACHINES, Duplex

Cincinnati Milling Machine Co., Cincinnati, Ohio.
Consolidated Machine Tool Corp., Rochester, N. Y.
Espen-Lucas Mch. Works, Front St. and Girard Ave., Philodelphia, Pa.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill., Kearney & Trecker Corp., Milwaukee, Wis.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.
U. S., Tool Co., Inc., 255 North 18th St., Ampere, N. J.

#### MILLING MACHINES, Hand

Frew Machine Co., 121 East Luray St., Philodelphia 20, Pa.
Nichols-Morris Corp., 50 Church St., New York. N. Y.
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.
Van Norman Co., 3640 Main St., Springfield 7, Mass.

(Continued on page 406)



THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.

DRILLING & TAPPING

MACHINES

# THE ELECTIONAL LINE

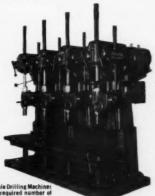
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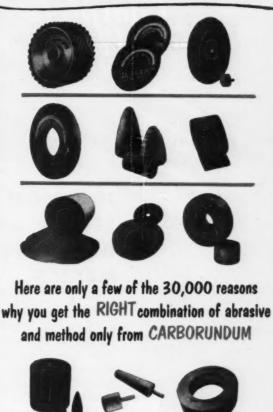
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De Vlieg Machine Co., 450 Fair Ave., Ferndale, Detroit 20, Mich.
Gotton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.
Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III.
Kearney & Trecker Corp., Milwaukee, Wis.
Kempsmith Machine Co., 1819 S. 71st St., Milwaukee 14, Wis.
Marac Mchry. Corp., 1819 Broadway, New York, N. Y.
Neise, Karl A., Dept. M., 381 Fourth Ave., New York 16, N. Y.
Orban, Kurt, Co., 205 E. 42nd St., New York 17, N.
Pratt & Whitney, West Hartford 1, Conn.
Sheldon Machine Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, III.
Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.
Van Norman Co., 3640 Main St., Springfield 7, Mass.

#### MILLING MACHINES, Lincoln Type

Brown & Sharpe Mfg. Co., Providence, R. I. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

#### MILLING MACHINES, Planer Type

Consolidated Machine Tool Corp., Rochester, Spen-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa. Ave., Philadelphia, Pa.
Giddings & Lewis Machine Tool Co., Fond du
Lac, Wis.
Gray, G. A., Co., Woodburn Ave. and Penn.
R. R., Evanston, Cincinnati, Ohio.
Ingersoll Milling Mch. Co., 2442 Douglas St.,
Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Pratt & Whitney, West Hartford 1, Conn.

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Cincinnati Milling Machine Co., Cincinnati, Ohio. Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N.Y.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.
Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.
Orban, Kurt, Co., 205 E. 42nd St., New York 17, N.Y.
Pratt & Whitney, West Hartford 1, Conn.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

#### MILLING MACHINES, Ram Type Universal

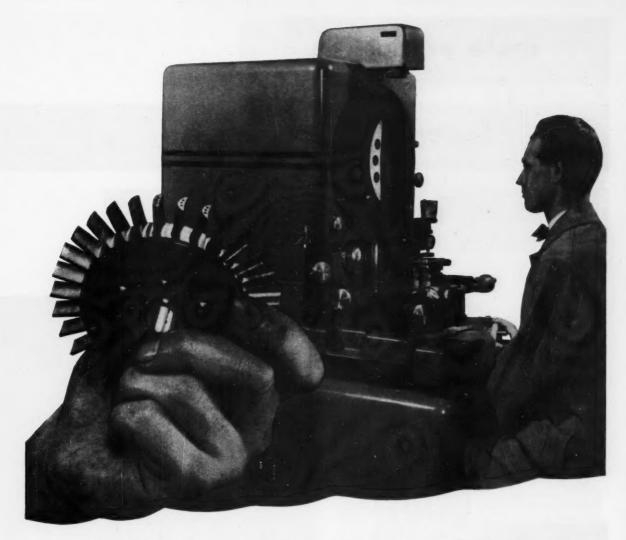
Van Norman Co., 3640 Main St., Springfield 7, Mass.

#### MILLING MACHINES, Turret Type

Bridgeport Machines, Inc., Linley Ave., Bridge-port, Conn.

#### MILLING MACHINES, Vertical

MILLING MACHINES, Vertical
British Industries Corp., International Mchry.
Div., 164 Duane St., New York, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati,
Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Gorton, Geo., Mch. Co., 1110 W. 13th St.,
Rocine, Wis.
Ingersoll Milling Mch. Co., 2442 Douglas St.,
Rockford, III.
Kearney & Trecker Corp., Milwaukee, Wis.
Marac Mchry. Co., 1819 Broadway, New York
N. Y.
Neise, Karl A., Dept. M. 381 Fourth Ave. Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y. (Continued on page 410)



## For Rapid, Accurate Inspection of Difficult Shapes

If you've been thinking of inspection by optical comparison only in terms of silhouetting simple parts, you may be overlooking a chance to lower your inspection costs, speed the work.

For example, with the Kodak Contour Projector, there's a trick made possible by the unique Surface Illuminator. To inspect the above impeller that goes into a jet engine component, Eclipse-Pioneer Division of Bendix Aviation Corporation projects the end of a blade by light directed straight on it out of the same lens that picks up the image. Conventional shadow projection just wouldn't do it.

In measuring this part, the two micrometers used operate independently of the elevating and cross-travel screws to eliminate strain and wear. They

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If your need is for toolroom measurement, the Kodak Contour Projector, Model 2A, is your choice. If your need is for fast production inspection, the economical, stripped-down Model 3 will meet your requirements. There is a field engineer in your area who will be glad to discuss your requirements with you. No obligation, of course. To get started, write to Eastman Kodak Company, Industrial Optical Sales Division, Rochester 4, N. Y.

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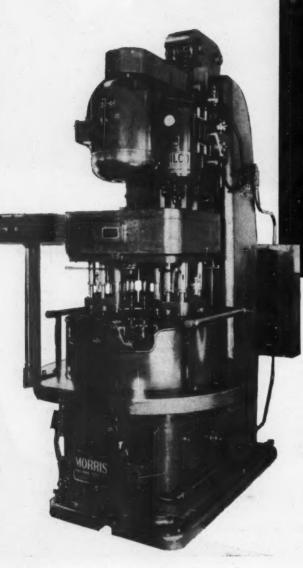


A new sound movie shows how to simplify complex inspection problems. We'lf tell you how to get it for a showing. Kodak

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... faster ... at lower cost

... to closer limits!



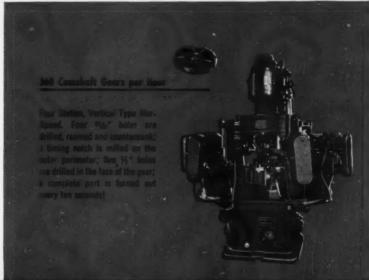
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MACHINES





562 Connecting Rod Caps per Hour

Hand-clamped in pairs, forged steel (SAE 1041) connecting rod caps are rough spot faced, finished spot faced and countersunk ... a total of 12 operations on the two parts ... at a rate of one part every 6½ seconds!





You can be sure of savings ... positive of production ... when you turn a multiple drilling, reaming, tapping, boring problem over to MORRIS. Although each Mor-Speed Machine is designed to save time, money, handling, floor space and capital investment ... all are built from standard units to do a special job. The result is more completed parts—in less time—at lower cost.

If your work involves multiple drilling or similar operations, in any combination, on any type of part, consult Morris Engineers. They'll help you meet production demands and shoot holes in cost figures at the same time.

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#### MODEL AND EXPERIMENTAL WORK See Special Machinery and Tools.

MOLD AND DIE COPYING MACHINES Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis. Pratt & Whitney, West Hartford 1, Conn.

MOLDING MACHINES, Plastic American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Reed-Prentice Corp., 677 Cambridge St., Wor-cester, Mass. Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, III. Watson-Stillman Co., Aldene Rd., Roselle, N. J.

#### MOLYBDENUM

Climax Molybdenum Co., 500 5th Ave., New York, N. Y.

#### MOTORS, Electric

Delco Products Div., General Motors Corp., 321 E. First St., Dayton, Ohio. General Electric Co., Schenectady, N. Y. Reliance Elec. & Engrg. Co., Collinwood Sta., 1088 Ivanhoe Rd., Cleveland, Ohio.

#### MOTORS, Hydraulic

Gerotor May Corp., Oliver St. and Maryland Ave., Baltimore, Md. Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

#### MULTIPLE-SLIDE FORMING MACHINES

Nilson Machine Co., A. H., 1506 Railroad Ave., Bridgeport, Conn. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

#### NIBBLING MACHINES

Campbell Machine Div., American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport, Conn.
Wales-Strippit Corp., North Tonawanda, N. Y.

#### NIBBLING MACHINES, Nickel

International Nickel Co., Inc., 67 Wall St., New York, N. Y.

#### NIPPLE THREADING MACHINERY

Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio. Landis Machine Co., Inc., Waynesboro, Pa.

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National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.

#### NUT SETTING EQUIPMENT

See Screw Driving and Nut Setting Equipment.

#### **NUT TAPPERS**

See Bolt and Nut Machinery.

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Chicago Screw Co., Bellwood, III.
Parker-Kalon Corp., 200 Varick St., New York
14, N. Y.
Republic Steel Corp. (Union Drawn Steel Div.),
Republic Bldg., Cleveland 1, Ohlo.
Union Drawn Steel Co. Div., Republic Steel
Corp., Massillon, Ohio.

#### **NUTS, Self-Locking**

Grip Nut Co., 310 S. Michigan Ave., Chicago 4,

#### NUTS, Thumb or Wing and Cap

Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio. Republic Steel Corp., Bolt and Nut Div., Re-public Bldg., Cleveland 1, Ohio. Williams, J. H., & Co., 400 Vulcan St., Buffale 7, N. Y.

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Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, III.

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#### OIL GROOVERS

Wicaco Machine Co., Stenton Ave. and Louden St., Philadelphia, Pa.

#### OIL-HOLE COVERS

Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, III.

#### OIL SEALS

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#### OILERS AND LUBRICATORS

Gits Bros, Mfg. Co., 1846-62 Kilbourn Ave. Chicago, III. Madison-Kipp Corp., Madison, Wis.

#### OILS. Cutting

See Cutting and Grinding Fluids. (Continued on page 414)

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Nine of Alcon's 30-Ton Press-Rites.

ALCON METAL PRODUCTS, INC., manufacturers of radio and electronic components at Chicago, Illinois, have a battery of 11 30-ton Press-Rites in operation.

Says Mr. C. P. DeVito, Vice-President and General Manager: "We are using our Press-Rites to stamp brass and steel terminals used in radio, television and electronic components. Processes performed include drawing, perforating, forming and blanking. By the use of progressive dies and automatic roll feeds, we are producing up to 600 pieces per minute per press.

We have found our Press-Rites extremely efficient and are well pleased with their performance. Due to their oiling system, they require very little maintenance."

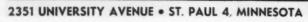
> Alcon's experience of yesterday and today, can be yours of tomorrow. Specify Press-Rite Power Presses for your production line!

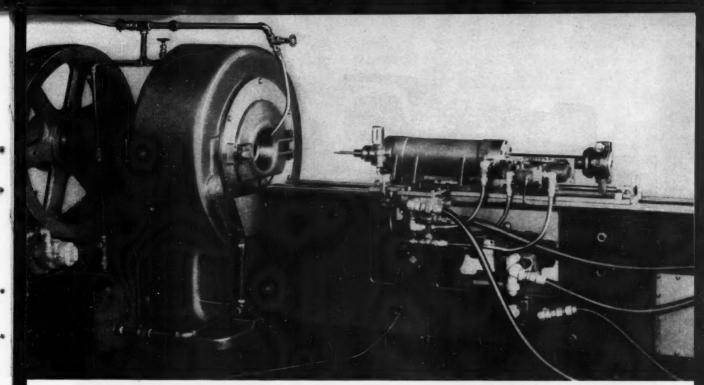
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FENN SWAGING MACHINE, featuring hydraulic feed, automatic chucking, and oil-cooled dies, is fast replacing

lathes and screw machines for shaping a wide range of metal parts because it . . .

# MAKES METAL GO TWICE AS FAR

Yes, you can cut your metal requirements in half, in many cases, with this Fenn Swaging Machine. That's because it doubles the length of the blanks it shapes . . . with absolutely no stock removal.

#### MANY OTHER ADVANTAGES

What's more, this Fenn Swager produces a denser structure in metal parts... maintains concentricity...gives an improved finish...requiring no subsequent grinding...calls for less operator skill than any other machine capable of producing equivalent parts.

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It will pay you to investigate all the costcutting, material-saving advantages of the Fenn Swager. Contact the Fenn distributor nearest you for facts and delivery schedules, or write direct to THE FENN MANUFACTURING COMPANY, 1857 Broad St., Hartford 1, Conn.



SIMPLE DIE CHANGES, using blanks in various diameters, make Fenn Swaging Machines quickly and easily adaptable to a wide variety of jobs. You can use them for reducing, pointing, or forming bar stock or tubing. Also for assembling fittings to cables. Fenn Swagers and Hydro-Formers come in sizes and designs for every swaging



# Shaping metal for better and stronger products at lower cost

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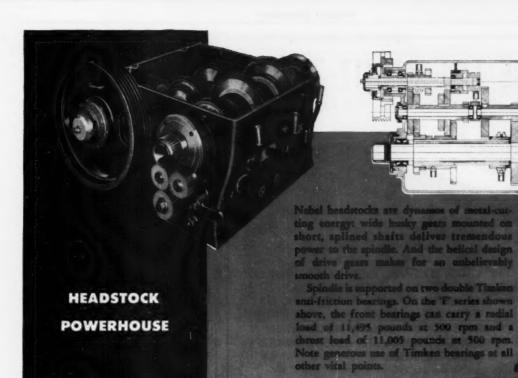
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FENN FEEDING DEVICES, either manually or hydraulically operated, are available for all sizes of swagers. They speed up production and reduce operator fatigue.





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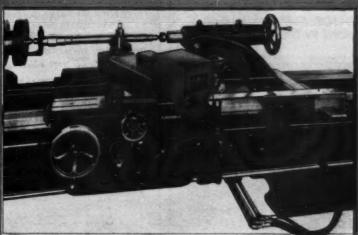
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Nebel now offers a hydraulic duplicating attachment for all Nebel lastes. The short-cou-pled design of the traces arm produces with greater accu-racy because is eliminates and power of Nebel lathes in duplicating operations.

THE NEEL MACHINE TOOL CO., CINCINNATI 25, OHIO, U.S. A. workhorse of the metal-working shap since 1899.





SPIRAL FLUTE TAPS ARE MADE AS STANDARD WITH RIGHT-HAND SPIRAL FLUTES DE-SIGNED TO GIVE A SHEARING CUT IN ORDER TO CARRY CHIPS UP AND OUT OF THE HOLE. THIS ACTION IS ACTUALLY THE OPPOSITE OF THE SPIRAL POINT TAP. THESE ARE COMMONLY USED FOR DEEP HOLE TAPPING IN BLIND HOLES WHERE IT IS ADVANTAGEOUS TO REMOVE THE CHIPS FROM THE HOLE.

SPIRAL POINT TAP

**Simminum** SPIRAL POINT TAPS, COMMONLY CALLED "GUN POINT" TAPS, ARE MADE TO DRIVE CHIPS AHEAD OF THE TAP. THESE ARE USED FOR PRODUCING MOST OPEN HOLE THREADS. THIS TAP IS INHERENTLY STRONGER THAN THE REGULAR STRAIGHT-FLUTE TAP BECAUSE THE FLUTES ARE SHAL-LOWER AND ARE NOT USED FOR CHIP CLEARANCE, CUTTING IS ALL DONE IN THE SPIRAL POINT.

THREAD MORE HOLES WITH FEWER TAPS INSIST ON ...





TOOL COMPANY

NEW BEDFORD, MASS., U.S.A.

#### OILS, Lubricating

OlLS, Lubricating
Cities Service Oil Co., 70 Pine St., New York, N. Y.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia, Pa.
Pure Oil Co., 35 E. Wacker Drive, Chicago, III.
Shell Oil Co., 50 West 50th St., New York, N. Y.
Sinclair Refining Co., 630 5th Ave., New York, N. Y.
Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, III. Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, III. Stuart Oil Co., Ltd., D. A., 2739 S. Troy St., Chicago 23, III. Sun Oil Co., 1608 Walnut St., Philadelphia, Pa. Texas Co., 135 E. 42nd St., New York, N. Y. Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y.

#### OILS, Quenching and Tempering

Cities Service Oil Co., 70 Pine St., New York, N. Y. N. T. Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia, Pa. Shell Oil Co., 50 West 50th St., New York, N. Y. N. Y. Sinclair Refining Co., 630 5th Ave., New York, N. Y. Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, III. Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St., Chicago 23, III.

#### OILS, Soluble

See Compounds, Cutting, Grinding, Metal Drawing, Etc.

#### ORDNANCE MACHINES, Special

Rehnberg-Jacobson Mfg. Co., 2135 Kishwaukee St., Rockford, III.

#### PACKING, Leather, Metal, Rubber, Asbestos, Etc.

Garlock Packing Co., Palmyra, N. Y. Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia, Pa.

#### PARALLELS

Brown & Sharpe Mfg. Co., Providence, R. I. Rahn Granite Surface Plate Co., 637 No. Western Ave., Dayton, Ohio. Starrett, The L. S., Co., Athol, Mass. Taft-Peirce Mfg. Co., Woonsocket, R. I. Walker, O. S., Co., Inc., Worcester, Mass.

#### PATTERNS, Wood and Metal

Mummert-Dixon Co., Hanover, Pa.

#### PHOSPHOR BRONZE-See Bronze.

#### PILLOW BLOCKS

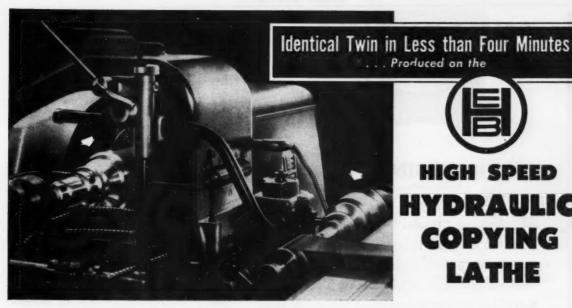
Boston Gear Works, 3200 Main St., North Quincy 71, Mass. C & C Sales Corp., 1771 Broadway, New York 19, N. Y. Norma-Hoffmann Bearings Corp., Stamford, Conn. Shafer Bearing Corp., Downers Grove, III. S K F Industries, Inc., P. O. Box 6731, North Philadelphia, Pa. Standard Pressed Steel Co., Jenkintown, Pa.

#### PIPE, BRASS AND COPPER

American Bross Co., 25 Broadway, New York, N. Y. N. Y.
Chase Brass & Copper Co., Inc., 1949 Rodney
St., Waterbury 20, Conn.
Orban, Kurt, Co., 205 E. 42nd St., New York
17, N. Y.
Revere Copper & Brass Inc., 230 Park Ave.,
New York, N. Y.

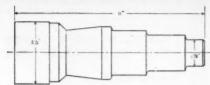
#### PIPE STEEL

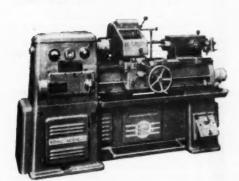
Allegheny Ludium Steel Corp., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa. Orban, Kurt, Co., 205 E. 42nd St., New York Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio. Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III. United States Steel Corp., National Tube Co. Div., 436 7th Ave., Pittsburgh, Pa. (Continued on page 416)





## HIGH SPEED HYDRAULIC COPYING LATHE





Examine this miracle of modern engineering made possible by the H.E.B. High Speed Hydraulic Copying Lathe. Pictured at the right is the turned master; at the left you see its identical twin - a shaft of S.A.E. 4130 steel accurately copied in just 3% minutes. That's breathtaking speed for such precision finish.

The H.E.B.'s patented tracer device is built into this ruggedly constructed lathe. There are no troublesome attachments, and setting time takes no more than 10 to 20 minutes. Experience on production lines proves time and again that finished parts are copy-turned up to 300% faster than on multi-tool lathes!

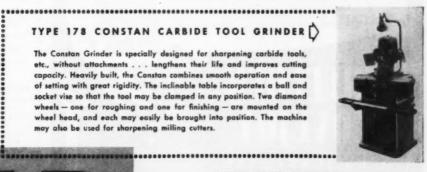
With its 20 H.P. motor the OP Model takes heavy cuts with carbide tools at spindle speeds 50 to 3600 RPM. GT Models with rotating pattern are designed for copying an infinite variety of irregular, non-circular work.

More than 1000 of these modern copying lathes are now in use worldwide . . . designed and built in France by H. Ernault Batignolles, manufacturers of machine tools for almost a hundred years.

Catalogs on both of these machines, including complete specifications, are available upon request. Write or telephone now for catalog or demonstration.

#### TYPE 178 CONSTAN CARBIDE TOOL GRINDER

The Constan Grinder is specially designed for sharpening carbide tools, etc., without attachments . . . lengthens their life and improves cutting capacity. Heavily built, the Constan combines smooth operation and ease of setting with great rigidity. The inclinable table incorporates a ball and socket vise so that the tool may be clamped in any position. Two diamond wheels - one for roughing and one for finishing - are mounted on the wheel head, and each may easily be brought into position. The machine may also be used for sharpening milling cutters.



IMMEDIATE DELIVERY

H. E. B. MACHINE TOOLS, INC. 475 FIFTH AVENUE, NEW YORK 17, N. Y.

Telephone: LExington 2-0266

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MACHINERY, October, 1952-415

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# ANNOUNCING...



#### OIL HARDENING TOOL STEEL

WL introduces "Whelco"—a new tool steel of M grade—a new steel of maximum toughness, hardness and strength—a steel to assure maximum results at low cost! "Whelco" offers great penetration of hardness, great toughness at high hardness, wide hardening range, fine grain structure, and desirable non-deforming characteristics. "Whelco" has good forging properties and is readily machinable in the annealed condition. All WL warehouses stock "Whelco" M tool steel in a wide variety of flats and squares. Call your nearest WL man for a trial order—the results will speak for themselves!

WL steels are metallurgically constant. This guarantees uniformity of chemistry, grain size, hard-enability—thus eliminating costly changes in heat treating specifications.

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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#### PIPE THREADING AND CUTTING

Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio. Landis Machine Co., Inc., Waynesboro, Pa.

#### PIPE TONGS

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E M Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### PLANER ATTACHMENTS

Consolidated Mch. Tool Corp., Rochester, N. Y. Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Gray, G. A., Co., Woodburn Ave. and Penn. R. R., Evanston, Cincinnati, Ohio.
Northwestern Tool & Engrg. Co., 117 Hallier, Dayton, Ohio.

Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.

#### PLANERS, Double Housing and Openside Baldwin-Lima-Hamilton Corp., Philadelphia 42,

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio (Plate). Consolidated Mch. Tool Corp. (Incl. Plate, Rotary and Crank Types), Rochester, N. Y. Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Gray, G. A., Co., Woodburn Ave. and Penn. R. R., Evanston, Cincinnati, Ohio. Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, III.

#### PLASTIC AND PLASTIC PRODUCTS

Bakelite Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

#### PLATE ROLLS

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y. Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

#### PLATES, Angle

Rahn Granite Surface Plate Co., 637 N. Western Ave., Dayton, Ohio.

Brown & Sharpe Mfg. Co., Providence, R. I.

#### **PLATES, Surface**

Challenge Machinery Co., Grand Haven, Mich. Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Pratt & Whitney Div., West Hartford 1, Conn. Rahn Granite Surface Plate Co., 637 N. Western Ave., Dayton, Ohio.
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.
Tatt-Peirce Mfg. Co., Woonsocket, R. I.

U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J. Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

#### PNEUMATIC EQUIPMENT

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio. Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Hanna Engineering Works, 1752 Elston Ave., Chicago, III. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III.

Ingersoll-Rand Co., Phillipsburg, N. J. Logansport Machine Co., Inc., Loganport, Ind. Mead Specialties Co., 4114 North Knox Ave., Chicago 41, III. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, III.

#### POLISHING LATHES AND MACHINES

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md. Gordner Machine Co. (Div. Landis Tool Co.), 414 E. Gardner St., Beloit, Wis. (Continued on page 418)

416-MACHINERY, October, 1952





One of the many types and sizes of McClintock pans









# SMOOTH way to do a SMOOTH JOB

McClintock Manufacturing Co. of Los Angeles manufactures an extensive line of metal platters and pans used by up-to-date markets for the display of meat. For space in the cabinets, the pans must be rectangular; for sanitary reasons they must be one-piece and perfectly smooth. And they can't cost too much, either.

In the picture you see how McClintock uses a Clearing hydraulic press in drawing these pans. Automatic sequence control simplifies operation and delivers maximum production. Cushion pressure is accurately regulated, and the result is a smooth piece smoothly produced every time.

Whether your metal forming problem is like this one, or entirely different, Clearing engineers can help you. Clearing makes both mechanical and hydraulic presses to fit virtually any production requirement.

#### CLEARING MACHINE CORPORATION

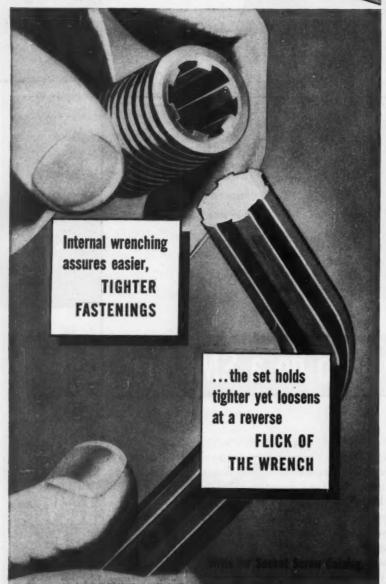
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CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

# Frequent Take-apart is easy for this Maintenance Man





THE BRISTOL COMPANY, Socket Screw Division, Waterbury 20, Conn

Hammond Machinery Builders, Inc., 1600
Douglas Ave., Kalamazoo 54, Mich.
Hill Acme Co., 1201 W. 65th St., Cleveland 2,
Ohio.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Millers Falls Co., Greenfield, Mass.
Sundstrand Machine Tool Co., 2531 11th St.,
Rockford, III.

#### POLISHING TOOLS, Portable

Jarvis, Charles L., Co., Middletown, Conn. Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

#### POWER UNITS, Hydraulic

See Hydraulic Power Units or Tool Heads.

#### PRESSES, Air

Famco Machine Co., 1300 18th St., Racine, Wis.

#### PRESSES, Arbor

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.
Dake Engine Co., 604 Seventh St., Grand Haven, Mich.
Famco Machine Co., 1300 18th St., Racine, Wis.

Farquhar Co., A. B., 21 Duke St., York, Pa. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago

III.
Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y.
Logansport Machine Co., Inc., Logansport, Ind.
Tomkins-Johnson Co., 614 No. Mechanic St., Jackson, Mich.
Watson-Stillman Co., Aldene Rd., Roselle, N. J.
Wilson, K. R., 215 Main St., Buffalo, N. Y.

#### PRESSES, Broaching

American Broach & Mch. Co., Ann Arbor, Mich. Bliss Co., E. W., 1375 Raff Rd., S. W., Canton. Bliss Co., E. W., 1375 Raft Rd., S. W., Canton. Onio.
Colonial Broach Co., Detroit 13, Mich. Dake Engine Co., 604 Seventh St., Grand Haven, Mich. Farauhar Co., A. B., 21 Duke St., York, Pa. Ferracute Machine Co., Bridgeton, N. J. Lake Erie Engra. Co., Kemmore Station, Buffalo, N. Y.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Watson-Stillman Co., Aldene Rd., Roselle, N. J.

#### PRESSES, Extrusion

PRESSES, Extrusion

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.

Chambersburg Engra. Co., Chambersburg, Pa. Farquhar Co., A. B., 21 Duke St., York, Pa. Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1, NY.

Lake Erie Engrg. Co., Kenmore Station, Butfalo, N. Y.

Watson-Stillman Co., Aldene Rd., Roselle, N. J.

#### PRESSES, Foot

Bliss Co., E. W., 1375 Roff Rd., S. W., Canton, Ohio. Ohio. Famco Machine Co., 1300 18th St., Racine, Wis. Wis.
Ferracute Machine Co., Bridgeton, N. J.
Niagara Machine & Tool Works, 683 North-land Ave., Buffalo, N. Y.
V & O Press Co., Div. Emhart Mfg. Co., Hadson, N. Y.

#### PRESSES, Forging

Ajax Mfg. Co., Euclid, Cleveland 17, Ohio.
American Steel Foundries, Elmes Engrg. Div.,
Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.
Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio. Ohio. Clearing Machine Corp., 6499 W. 65th St., Chicago 38, III. Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio. (Continued on page 420)



# Quantity Production

- Quantity production of identical gears offers a challenge that we here at BRAD FOOTE are eager to accept.
- Multiple spindle machines, duplicate machines, numerous and varied machines, <u>every</u> machine that's needed—PLUS men of long experience making close tolerance gears... these factors make it possible for us to confidently accept such a challenge.
- When you specify BRAD FOOTE gears, you do so with the knowledge that each gear will be made to exact specifications; that every gear of a quantity will be identical in structure, in size, and in appearance; that each operation on every gear will be performed by BRAD FOOTE people in BRAD FOOTE shops. No one will share our responsibility.
- You will be satisfied with the BRAD FOOTE gears you buy because they will give long, economical service on the equipment you operate, or on the machines you sell to others.
- Your inquiries are invited.

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MACHINERY, October, 1952-419

Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Farquhar Co., A. B., 21 Duke St., York, Pa. Ferracute Machine Co., Bridgeton, N. J. Henry & Wright Div., Emhart Mfg. Co., 760 Windsor St., Hartford 1, Conn.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1,

Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.

Morgan Engrg. Co., Alliance, Ohio.

National Mchry. Co., Greenfield and Stanton Sts., Tiffin, Ohio.

Niagora Machine & Tool Works, 683 North-land Ave., Buffalo, N. Y.

& O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y.

Verson Alisteel Press Co., 93rd St. and S. Ken-wood Ave., Chicago, III.

Watson-Stillman Co., Aldene Rd., Roselle, N. J. Wilson, K. R., 215 Main St., Buffalo, N. Y. Zeh & Hahnemann Co., 182 Vanderpool St. Newark, N. J.

#### PRESSES, Hydraulic

American Broach & Mch. Co., Ann Arbor, Mich. American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, III.

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

Bethlehem Steel Co., Bethlehem, Pa.

Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa. Bliss Co., E. W., 1375 Raff Rd., S. W., Canton,

Chambersburg Engrg. Co., Chambersburg, Pa. Clearing Machine Corp., 6499 W. 65th St., Chicago 38, III.

Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.

Columbia Mchry. & Engrg. Co., Hamilton 1, Ohio.

Dake Engine Co., 604 Seventh St., Grand Haven, Mich. Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.

Farquhar Co., A. B., 21 Duke St., York, Pa. Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.

Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.

Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.

Morgan Engrg. Co., Alliance, Ohio.

Niogara Machine & Tool Works, 683 North-land Ave., Buffalo, N. Y. Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.

20, Mich.
Verson Alisteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, III.
Watson-Stillman Co., Aldene Rd., Roselle, N. J.
Wilson, K. R., 215 Main St., Buffalo, N. Y.

#### PRESSES, Pneumatic

Mead Specialties Co., 4114 North Knox Ave., Chicago 41, III.

#### PRESSES, Screw

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton,

Ohio.

Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Ferracute Machine Co., Bridgeton, N. J.

Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.

Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J.

#### PRESSES, Sheet Metal Working

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

Bath, Cyril, Co., 6984 Machinery Ave., Cleve-land 3, Ohio.

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio. Chambersburg Engrg. Co., Chambersburg, Pa. Cincinnati Shaper Co., Elam and Garrard Ave., Cincinnati, Ohio.

Clearing Machine Corp., 6499 W. 65th St., Chicago 38, III.

Cleveland Crane & Engrg. Co., Wickliffe, Ohio. Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.

Columbia Machinery & Engineering Corp., Hamilton 1, Ohio.

Consolidated Mch. Tool Corp., Rochester, N. Y. Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Danly Machine Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, III.

Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicogo 36, III.

Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa.

Famco Machine Co., 1300 18th St., Racine, Wis. Farguhar Co., A. B., 21 Duke St., York, Pa.

Ferracute Machine Co., Bridgeton, N. J. Henry & Wright Div., Emhart Mfg. Co., 760 Windsor St., Hartford 1, Conn.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

Johnson Mch. & Press Corp., 620 W. Indiana Ave., Elkhart, Ind.

Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.

L & J Press Corp., Elkhart, Ind.

Minster Machine Co., Minster, Ohio Niagara Machine & Tool Works, 683 North-land Ave., Buffalo, N. Y.

Sales Service Mch. Tool Co., 2363 University Ave., St. Paul, Minn.

Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, III. V

& O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y. Wales-Strippit Corp., North Tonawanda, N. Y. Watson-Stillman Co., Aldene Rd., Roselle, N. J. Wilson, K. R., 215 Main St., Buffalo, N. Y. Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J.

#### **PRESSES, Straightening**

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, III.

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

Chambersburg Engrg. Co., Chambersburg, Pa. Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.

Consolidated Mch. Tool Corp., Rochester, N. Y. Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Farquhar Co., A. B., 21 Duke St., York, Pa. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Hufford Machine Works, Inc., 1700 E. Grand Ave., El Segundo, Calif.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

Morgan Engrg. Co., Alliance, Ohio.

Niogara Mch. & Tool Works (Hydraulic), 683 Northland Ave., Buffalo, N. Y. Springfield Mch. Tool Co., Springfield, Ohio. Watson-Stillman Co., Aldene Rd., Roselle, N. J. Wilson, K. R., 215 Main St., Buffalo, N. Y.

#### PROFILING MACHINES

Consolidated Mch. Tool Corp., Rochester, N. Y. Cosa Corp., 405 Lexington Ave., New York 17,

Ex-Cell-O Corp., 1200 Oakman Bivd., Detroit 32. Mich. Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.

Gorton, George, Machine Co., 1110 W. 13th St., Racine, Wis.

(Continued on page 422)



# ANK YOU, DESIGN ENGINEERS!

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Helical
Worm
Herringbone
Internal
\*\*Coniflex Bevel
Spiral Bevel
Spline Shaft

\*Reg. U. S. Pat. Off.

n a recent survey conducted by DESIGN NEWS Magazine, trade publication for the design-engineering field, 705 design engineers were asked to list the gear manufacturers they would consider when specifying or buying special gears. Of the several hundred gear manufacturers in the United States, The Cincinnati Gear Company was among the first five most often mentioned in all categories—and second among firms producing custom made gears exclusively. And when you realize that these "first five" firms received over 50 percent of all the mentions, the results become even more impressive. The Cincinnati Gear Company actually received many, many times the number of mentions given many other firms having considerably larger production capacities. Such popularity and industry-wide acceptance can only be the result of the constant striving for perfection that has marked The Cincinnati Gear Company's long history—a history of custom craftsmanship of quality gears since 1907. To those design engineers who named The Cincinnati Gear Company in the DESIGN NEWS survey—as well as in their orders and specifications—our thanks! And to those design engineers who are unfamiliar with our company or our product-we invite your inquiry.



"Gears . . . Good Gears Only

THE CINCINNATI GEAR COMPANY

Wooster Pike and Mariemont Ave. • Cincinnati 27, Ohio

Morey Mchry. Co., Inc. (and Affiliated companies), 410 Broome St., New York, N. Y. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, III.

Pratt & Whitney, West Hartford 1, Conn Sheffield Corp., 721 Springfield, Dayton, Ohio.

#### PULLEYS

Boston Gear Works, 3200 Main St., North Quincy 71, Mass.

#### **PULLEYS, Friction Clutch**

Brown & Sharpe Mfg. Co., Providence, R. I.

#### PUMPS, Coolant, Lubricant and Oil

Bowser, Inc., 1365 E. Creighton Ave., Fort Wayne, Ind.

Brown & Sharpe Mfg. Co., Providence, R. I.

Delta Power Tool Div., Rockwell Mfg. Co., 620 E. Vienna Ave., Milwaukee, Wis.

Ingersoll-Rand Co., Phillipsburg, N. J. Logansport Machine Co., Inc., Logansport, Ind.

Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich.

Ruthman Machinery Co., 1809 Reading Rd., Cincinnati 12, Ohio. Tomkins-Johnson Co., Jackson, Mich.

Tuthill Pump Co., 939 E. 95th St., Chicago 19,

Viking Pump Co., Cedar Falls, Iowa.

#### PUMPS, Hydraulic

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Baldwin-Lima-Hamilton Corp., Philadelphia 42,

Barnes, John S., Corp., Rockford, III.

Bethlehem Steel Co., Bethlehem, Pa. Brown & Sharpe Mfg. Co., Providence, R. I. Chambersburg Engrg. Co., Chambersburg, Pa. Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.

Gerotor May Corp., Oliver St. and Maryland Ave., Baltimore, Md.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

Ingersoll-Rand Co., Phillipsburg, N. J. Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.

Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

Tuthill Pump Co., 939 E. 95th St., Chicago 19.

Viking Pump Co., Cedar Falls, Iowa

#### **PUMPS, Pneumatic**

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#### **PUMPS**, Rotary

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Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich.

Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

Tuthill Pump Co., 939 E. 95th St., Chicago 19,

Viking Pump Co., Cedar Falls, Iowa.

#### PUMPS, Vacuum

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Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.

Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio. Columbia Machinery & Engineering Corp., Hamilton 1, Ohio.

Consolidated Mch. Tool Corp., Rochester, N. Y. Famco Machine Co., 1300 18th St., Racine, Wis.

Ferracute Machine Co., Bridgeton, N. J. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III.

Kling Bros., Engineering Works, 1320 No. Kostner Ave., Chicago 51, III.

Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.

O'Neill-Irwin Mfg. Co., Lake City, Minn. Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

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(Continued on page 424)



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Massachusetts Gear & Tool Co., 36 Nassau St., Woburn, Mass. Ohio Gear Co., 1333 E. 179th St., Cleveland,

Philadelphia Gear Works, Inc., Erle Ave. and G St., Philadelphia, Pa. Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 14, Ohio.

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National Twist Drill & Tool Co., & Winter Bros. Co., Rochester, Mich. Pratt & Whitney, West Hartford 1, Conn.

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Gerham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.

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Pratt & Whitney, West Hartford 1, Conn. Standard Tool Co., 3950 Chester Ave., Cleve-land, Ohio.

Taft-Peirce Mfg. Co., Woonsocket, R. I. Union Twist Drill Co., Athol, Mass. Wesson Co., 1220 Woodward Heights Bivd., Ferndale, Mich.

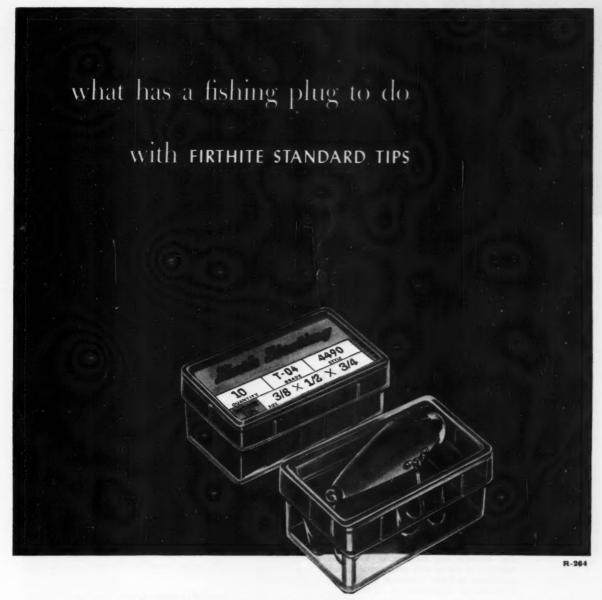
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(Continued on page 426)



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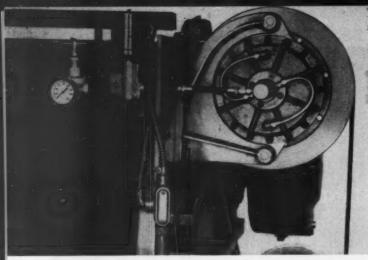
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Bristol Co., Platts Mills, Waterbury, Conn.

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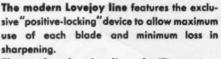
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Skill Corp., 5039 Eiston Ave., Chicago, Ill.
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

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DoAll Co., 254 Laurel Ave., Des Plaines, III.
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(Continued on page 430)

Praduct Directory

# 205

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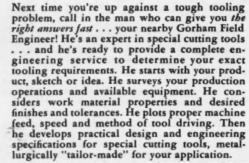
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DoAll Co., 254 Laurel Ave., Des Plaines. Ill.
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St., Chicago 18, Ill.
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SAWS, Circular Metal Cutting
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DoAll Co., 254 Laurel Ave., Des Plaines, Ill.
Espen-Lucas Machine Works, Front St. and
Girard Ave., Philadelphia, Pa.
Gorham Tool Co., 14400 Woodrow Wilson,
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Motch & Merryweather Mchry. Co., Penton
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SAWS, Metal Cutting Bend

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Simonds Saw & Steel Co., 470 Main St., Fitch-burg, Mass.

Starrett, The L. S., Co., Athol, Mass.

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National Twist Drill & Tool Co., & Winter Bros.
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Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Starrett, The L. S., Co., Athol, Mass.
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### SCRAPERS, Hand and Power

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, III (Continued on page 432)



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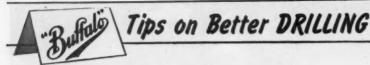
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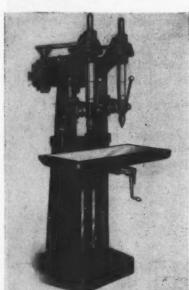
Hartford Detroit Chicago

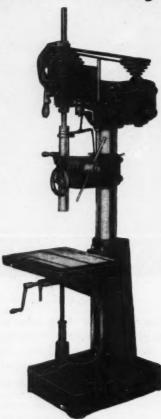


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e, "Buffelo" No. 22 Drill for work up to 2" capacity in iron. Note rigid construction. Write for Bulletin 2989-F.

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440 BROADWAY

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Gorham Tool Co., 14400 Woodrow Wilson.
Detroit, Mich.
Greenlee Bros. & Co., 12th and Columbia Aves.,
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Millers Falls Co., Greenfield, Mass.
National Acme Co., 170 E. 131st St., Cleveland,
Ohio. National Acme Co., 170 E. 131st St., Cleveland, Ohio.
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.
Potter & Johnston Co., 1027 Newport Ave., Pawtucket, R. I.
R and L Tools, 1825 Bristol St., Philadelphia 40, Pa.
Warner & Swasey Co., 5701 Carnegle Ave., Cleveland 3, Ohio.

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Cleveland Automatic Machine Co., 4932 Beech 51., Cincinnati 12, Ohio.
Eastern Mch. Screw Corp., New Haven, Conn. Maryland Precision Instrument Co., 12 E. Lanvale St., Baltimore 2, Md. Morse Twist Drill & Mch. Co., New Bedford, Mass. National Acme Co., 170 E. 131st St., Cleveland, Ohio.
Ohio.
Ottemiller, W. H., Co., York, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Wicaco Machine Corp., Stenton Ave. and
Louden St., Philadelphia, Pa.

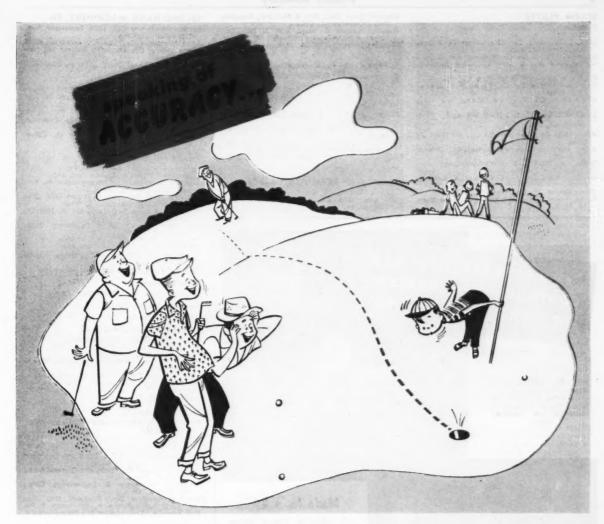
### SCREW MACHINES, Automotic Single and Multiple Spindle

Single that Matthie Spirital S Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. National Acme Co., 170 E. 131st St., Cleveland, National Acme Co., 170 E. 131st St., Cleveland, Ohio.
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.
Orban, Kurt, Co., 205 E. 42nd St., New York 17, N. Y.
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.
Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

### SCREW MACHINES, Hand

See also Lathes, Turret.

Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholf Machine Co., 1245 E. Washington Ave.,
Madison 10, Wis.
Hardinge Bros., Inc., 1418 College Ave., Elmira,
N. Y. N. Y.
Orban, Kurt, Co., 205 E. 42nd St., New York
17, N. Y.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.
Simmons Mch. Tool Corp., 1600 N. Broadway.
Albany, N. Y.
Warner & Swasey Co., 5701 Carnegie Ave.,
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"Jeepers! That putter of Mac's is as accurate as a



Logan No. 955
QUICK CHANGE GEAR LATHE
11" Swing, 1" Collet
Capacity, 1%" Spindle Hole

# Logan LATHE!"

precision results have made the Logan Lathe one of the world's most widely used machine tools. Logan advanced design and rugged, precise construction assure accuracy that stands up under hard daily use. Because the Logan ball bearing spindle, for example, needs no adjustment for any speed from 45 to 1500 rpm, original accuracy is preserved. The two V-ways and two flat ways of the Logan bed are precision ground to a tolerance of .0005", and are warp-free. 11" swing, 1" collet capacity and 1\(^{1}\epsilon\) " spindle hole provide the capacity for a high percentage of any shop's metal turning. Important, too, is the fact that no other lathe of comparable specifications can match the Logan in economy.

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MACHINERY, October, 1952-433

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Card, S. W., Mrg. Co., Div. Union Twist Drill
Co., Mansfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
Morse Twist Drill & Mch. Co., New Bedford,

Mass.
Prott & Whitney, West Hartford 1, Conn.
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass. Inter Bros. Co., Rochester, Mich.

### SCREWS, Cap, Set, Safety Set and Machine, Etc.

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn. Allied Products Corp., 12677 Burt Rd., Detroit

23, Mich. Bristol Co., Platts Mills, Waterbury, Conn. Chicago Screw Co., Bellwood, III. National Acme Co., 170 E. 131st St., Cleveland,

Ohio.
Ottemiller, W. H., Co., York, Pa.
Ortemiller, W. H., Co., York, Pa.
Parker-Kalon Corp., 200 Varick St., New York
14, N. Y.

Republic Steel Corp, Bolt & Nut Div., Republic Bldg., Cleveland 1, Ohio. Russell, Burdsall & Ward Bolt & Nut Co., 100 Muland Ave., Port Chester, N. Y. Standard Pressed Steel Co., Jenkintown, Pa.

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Parker-Kalon Corp., 200 Varick St., New York 14, N. Y

Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.

assell, Burdsall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y. Illiams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

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Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave.
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### SEPARATORS, Centrifugal

De Laval Separator Co., Poughkeepsie, N. Y.

### SEPARATORS, Oil or Coolant

Barnes Drill Co. (Magnetic), 814 Chestnut, Rockford, III. National Acme Co., 170 E. 131st St., Cleve-land, Ohio.

### SHAFTING, Steel

Bethlehem Steel Co., Bethlehem, Pa.
Cumberland Steel Co., Cumberland, Md.
De Laval Separator Co., Poughkeepsie, N. Y.
LoSalle Steel Co., Hammond, Ind.
Republic Steel Corp., Union Drawn Steel Div.,
Republic Bldg., Cleveland I, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.

National Forge & Ordnance Co., Irvine, Warren County, Pa. Standard Pressed Steel Co., Jenkintown, Pa.

### SHAFTS, Flexible

Jarvis, Chas. L., Co., Middletown, Conn.

### SHAFTS, Hollow Bored

Bethlehem Steel Co., Bethlehem, Pa.

### SHAFTS, Turned and Ground

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Cumberland Steel Co., Cumberland, Md.
LaSalle Steel Co., Hammond, Ind.
National Forge & Ordnance Co., Irvine, Warren
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Republic Steel Corp., Union Drawn Steel Div.,
Republic Bidg., Cleveland 1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, III.

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Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, III.

American Tool Works Co., Pearl and Eggleston
Aves., Cincinnati, Ohio.
Cincinnati Apper Co., Elam and Garrard Aves.,
Cincinnati, Ohio.
Columbia Machinery & Engineering Corp.,
Hamilton I, Ohio.
Delta Power Tool Div., Rockwell Mg.
614G N Lexinaton Ave., Pitt-burch 8 Pa.
Hall Tool Co., 3240 Market St., Philadelphia 4, Pa.

Hall Tool Co., 3240 Market St., Philadeiphia 4, Pa.
Hendey Machine Co., Torrington, Conn.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Onsrud Machine Works, Inc., 3940 Palmer St.,
Chicago, Ill.
Rockford Mch. Tool Co., 2500 Kishwaukee St.,
Rockford Mch. Tool Co., 2500 Kishwaukee St.,
Rockford Mch. Tool Co., 2500 Kishwaukee St.,
Rockford Mch.

Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.

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British Industries Corp., International Mchry. Div., 164 Duane St., New York, N. Y. Pratt & Whitney, West Hartford 1, Conn. Rockford Mch Tool Co., 2500 Kishwaukee St., Rockford, III.

### SHAPES, Structural

Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
U. S. Steel Corp. (Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co., Div.), 436 7th Ave., Pittshurgh, Pa.

### SHEARING MACHINERY

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Cincinnati Shaper Co., Elam and Garrard Aves.,
Cincinnati, Ohio.
Cleveland Crane & Engrg. Co., Wickliffe, Ohio.
Cleveland Punch & Shear Works Co., 3917 St.
Clair Ave., N. E. Cleveland, Ohio.
Columbia Machinery & Engineering Corp.,
Hamilton 1, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Ferracure Machine Co., Bridgeton, N. J.
Hannitin Corp., 1101 S. Kilbourn Ave., Chicago,
III Hydropress, Inc., 350 Fifth Ave., New York 1,

(Continued on page 436)



The MAGNI-FORM Universal Contour Wheel Dresser is designed to fit any type horizontal surface grinder. It can be mounted on the magnetic chuck or directly on the machine table. Check these advantages and compare!

- 1. "Tenths" accuracy at once.
- 2. Simple operation gives high precision at low cost.
- 3. Lighter, more compact, better balanced. No interfering overhang.
- Dresses any complex contour that can be en-tered by the diamond across the full width of the wheel.

Uses a 10:1 ratio template to control movement of the diamond. Simple ratio arm and slide is without com-plicated linkages. The

MAGNI-FORM Universal Dresser is easy to set up, simple to operate. Write details in complete Bulletin M.

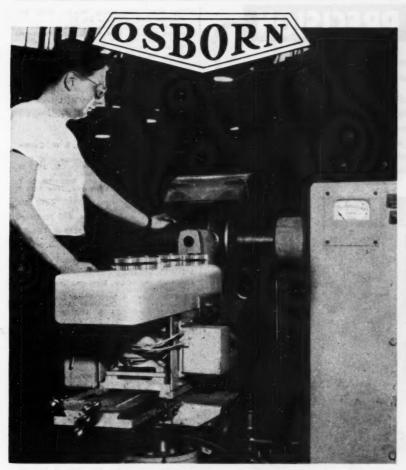


ENGINEERING AND MANUFACTURING CO. INC. BERKELEY HEIGHTS N. J.

Automatic Contour Wheel Dresser—for precision dressing of wheels for the production form grinding of Gear and Spline Profiles, Thread Forms, Gas Turbine Bucket Root

3. Universal Contour Wheel Dresser for Cylindrical Grinders—for 1" and 2" wide wheels.

Special Dressers for Aircraft Gear Grinding — producing o perfect blend between involute form and root fillet — AUTO-MATICALLY.



### Formerly 20... now deburrs 125 per hour

A new machine . . . the Osborn Work Holder Brushing Lathe . . . now deburrs gears and similar parts at the push of a button!

In the plant of Caterpillar Tractor Co., this automatic machine deburrs and finishes gear teeth six times as fast as the former hand method. Production now is 125 gears per hour. Output formerly was 20. Burrs and sharp edges are now removed uniformly. Every gear tooth has smooth, rounded edges and surfaces are blended.

Find out how you can speed deburring and improve product quality with this versatile Osborn machine. Call your Osborn Brushing Analyst today or write The Osborn Manufacturing Company, Dept. 835, 5401 Hamilton Avenue, Cleveland 14, Ohio.



OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear has smooth, uniform, rounded edges. Sur-faces are blended. These gears were de-burred on the machine shown at the left.



SET-UP IS SIMPLE. The machine is highly SET-UP IS SIMPLE. The machine is highly adaptable where production involves either large runs of a few parts or small runs of many different types and sizes of gears. Machine setups may be quickly made by unskilled operators. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing internal to suit the size shape or brushing interval to suit the size, shape or condition of part being brushed.



OPERATION 15 SPEEDY. The operator mounts the gear easily and quickly. The gear advances to the face of two rotating Osborn brushes and the edge of the gear teeth makes contact with the brushes. To assure fast, positive action on each piece brushed, an automatic control reverses the direction of brush rotation on every cycle of operation. This machine deburst 16 such of operation. This machine deburrs 14-inch hypoid gears in 11/2 minutes compared to 25 minutes for former method.

### INVESTIGATE IT TODAY

for your problems. Users report time savings ranging from 20% to 1570% with the Osborn Work Holder Brushing Lathe. Let us demonstrate what it can do for you!

### MED for PREC



William Tell Met The Supreme Test For Sureness of Hand and Precision of Aim

According to legend, the Swiss Hero, William Tell, refused to bow before a tyrant and consequently was ordered to shoot an apple off his own son's head. His courage and precise aim led to his undying fame and the later freedom of his country.

**Universal Tool and Cutter Grinders** 

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Costs go down - production goes up-when you equip with the Oliver Ace Tool and Cutter Grinder. Difficult cutters offer no problem - they can be ground easily on the Oliver Ace. Designed and built to give guaranteed accuracy, the proved, dependable Oliver Grinder excels on high speed and tungstencarbide work.

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Priced to meet your budget, the ACE excels for grinding face mills up to 15" - also, slab mills . slitting saws . dovetail cutters · angular cutters · double angle cutters · Fellows helical cutters · reamers · taper reamers · production gashing.

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O'Neill-Iwin Mfg. Co., Lake City, Minn.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
Watson-Stillman Co., Aldene Rd., Roselle, N. J.
Yoder Co., 550 Walworth Ave., Cleveland, Ohio.

SHEARS, Alligator Hill Acme Co., 1201 W. 65th St., Cleveland 2, Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

SHEARS, Rotary Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Punch & Shear Works Co., 3917 St.
Clair Ave., N. E., Cleveland, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Yess, Inc., 550 Fifth Ave., New York 1,
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N. Yess, Inc., 550 Fifth Ave., New York 1,
N. Yess, Inc N. Y.
Kling Bros. Engineering Works, 1320 No.
Kostner Ave., Chicogo 51, III.
Niagara Mch. & Tool Works, 683 Northland
Ave., Buffalo, N. Y.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicogo 18, III.
Simonds Saw & Steel Co. (Knives), 470 Main
St., Fitchburg, Mass.
Union Twist Drill Co., Athol, Mass.

SHEARS, Squaring Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio. Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio. Columbia Machinery & Engineering Corp., Hamilton 1. Ohio. Hamilton 1, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Famco Machine Co., 1300 18th St., Racine, Famco Machine Co., 1300 18th St., Racine, Wis, Kling Bros. Engineering Works, 1320 No. Kostner Ave., Chicago 51, III. Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y. Simonds Saw & Steel Co. (Blades), 470 Main St., Fitchburg, Mass.

SHEET METALS

Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa. American Brass Co., 25 Broadway, New York, N. Y. American Brass Co., 25 Broadway, New York, N. Y.
Bethilehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Inc., 1949 Rodney
St., Waterbury 20, Conn.
Republic Steel Corp., Republic Bldg., Cleveland
I, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
U. S. Steel Corp. (Carnegie-Illinois Steel Corp.
Div., Columbia Steel Co., Div., Tennessee
Coal, Iron & R. R. Co., Div.), 436 7th Ave.,
Pittsburgh. Pa.

SHEETS, Iron and Steel

Allegheny Ludium Steel Corp., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio. 1, Ohio.
yerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.,
S. Steel Corp. (Carnegie-Illinois Steel Corp.
Div., Columbia Steel Co. Div., Tennessee
Coal, Iron & R. R. Co. Div.), 436 7th Ave.,
Pittsburgh, Pa.

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Laminated Shim Co., Inc., Glenbrook, Cann.

SLEEVES

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Greenfield Tap & Die Corp., Greenfield, Mass. Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y. Morse Twist Drill & Mch. Co. National Twist Drill & Tool Co., Rochester, Mich. Mich. Pratt & Whitney, West Hartford 1, Conn. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio. Union Twist Drill Co., Athol, Mass.

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SOCKETS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. (Continued on page 438)

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HE precision stater shapes as it generates tooth forms the work meets your most exacting specifications and standards. Gear production requiring a shaping operation will be ideally MIKRON No. 134. performed with

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RACK & GEAR CUTTER No. 134-Another machine in the MIKRON line-Controlled Accuracy, High Finish, Ease of Set-Up.

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RACKS: (Straight or Skew) to 36" long x 1" wide. SEGMENTS & CLUSTERS: to 31/4" dia. x l" wide. INTERNAL GEARS: to 4" dia. x l" wide.

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Pratt & Whitney, West Hartford 1, Conn.
Standard Tool Co., 3950 Chester Ave., Cleve-iand, Ohio.
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Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

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Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.
Barnes Drill Co., 814 Chestnut, Rockford, Ill.
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.
Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.
Bethlehem Steel Co., Bethlehem, Pa.
Bligram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Blanchard Mch. Co., 64 State St., Cambridge, Mass.
Bliss. E. W., Co., 1375 Raff Rd., S. W., Conton.

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Colonial Broach Co., Detroit 13, Mich Columbia Machinery & Engineering

Colonial Broach Co., Detroit 13, Mich.
Columbia Machinery & Engineering Corp.,
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Columbus Die-Tool & Mch. Co., 955 Cleveland
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Consolidated Mch Tool Corp., Rochester, N. Y.
Earle Gear & Mch. Co., 4707 Stenton Ave.,
Wayne Junction, Philadelphia 44, Pa.
Espen-Lucas Mch. Works, Front St. and Girard
Ave., Philadelphia, Pa.
Ex-Celi-O Corp., 1200 Oakman Blvd., Detroit
32, Mich.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn. Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. Frew Machine Co., 121 East Luray St., Phila-delphia 20, Pa.

Gisholt Machine Co., 1245 E. Washington Ave., Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis. Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich. Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis. Amch. Co., 90 Silliman St., Bridgeport 5, Conn. Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, III. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago III.

Hartford Special Mchry. Co., 287 Homestead

St., Hartford, Conn. Hill Acme Co., 1201 W. 65th St., Cleveland 2,

Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

N. Y.
Ingersoll Milling Mch. Co., 2442 Douglas St.,
Rockford, Ill.
Jahn, B., Manufacturing Co., Ellis St., New
Britain, Conn.
Kingsbury Mch. Tool Corp., Keene, N. H.
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.
Lehmann Machine Co., 3560 Chouteau Ave.,

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falo, N. Y.
Lehmann Machine Co., 3560 Chouteau Ave.,
St. Louis, Mo.
Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y.
Maryland Precision Instrument Co., 12 E.
Lanvale St., Baltimare 2, Md.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit 12, Mich.
Moline Tool Co., 102 20th St., Moline, III.
Morgan Engrg. Co., Alliance, Ohio.
Morris Machine Tool Co., 9 Harriet St., Cinclinati 3, Ohio.
Morch & Merryweather Mchry. Co., Penton
Bldg., Cleveland, Ohio.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
National Automatic Tool Co., Inc., S. 7th and
N Sts., Richmond, Ind.
Notional Broach & Mch. Co., 5600 St. Jean
Ave., Detroit 2, Mich.
National Tool Co., 11200 Madison Ave.,
Cleveland, Ohio.
National Twist Drill & Tool Co., Rochester,
Mich.
New Britain Mch. Co., New Britain-Gridley

Mich. New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn. New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.

Niagara Mch. & Tool Works, 683 Northland Ave., Buffolo, N. Y. Pioneer Engrg. & Mfg. Co., 19679 John R St., Detroit, Mich. Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich. Prott & Whitney, West Hartford 1, Conn. Reed-Prentice Corp., 677 Cambridge St., Wor-cester, Mass. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass. Seneca Folls Mch. Co., Seneca Falls, N. Y.

Senera Falls Mch. Co., Seneca Falls, N. Y.
Seneca Falls Mch. Co., Seneca Falls, N. Y.
Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Turner Bros., Inc., 2625 Hilton Rd., Ferndale
20, Mich.
Union Twist Drill Co., Athol, Mass.
V & O Press Co., Div., Emhart Mfg. Co.,
Hudson, N. Y.
Waitham Machine Works, Newton St., Waltham Machine Horse, Newton St., Waltham Mass.
Wicaco Machine Corp., Stenton Ave. and
Louden St., Philadelphia, Pa.
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

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SPEED REDUCERS

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Boston Gear Works, 3200 Main St., North Quincy 71, Mass.

Brad Foote Gear Works, 1309 S. Cicero Ave., Cicero 50. III.
Cleveland Worm & Gear Co., 3249 E. 80th St., Cleveland, Ohio.
Cone-Drive Gears, Div. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Corn.
General Electric Co., Schenectady, N. Y.
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.

Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.
Perkins Mch. & Gear Co., Box 1611, Springfield 2, Mass.
Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Twin Disc Clutch Co., 1361 Racine St., Racine, Wis.

SPINDLES, Grinding

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Pope Mchry. Corp., Haverhill, Mass.

### SPINNING LATHES

See Chucking Machines.

### SPROCKET CHAINS

Atlantic Gear Works, Inc., 200 Lafayette St., New York 12, N. Y. Boston Gear Works, 3200 Main St., North Quincy 71, Mass. Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio. Ohio. Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.

### SPROCKETS

Atlantic Gear Works, Inc., 200 Lafayette St., New York 12, N. Y. Boston Gear Works, 3200 Main St., North Quincy 71, Mass. Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio Ohio.
Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.
Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 14, Ohio.

### STAMPINGS, All Metal

LaSalle Steel Co., Hammond, Ind.

### STAMPINGS, Sheet Metal

Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa. burgh, Pa.
Dayton Rogers Mfg. Co., 2824 13th Ave., S.,
Minneapolis 7, Minn.
Laminated Shim Co., Inc., Glenbrook, Conn.
Republic Steel Corp., Niles Steel Products Div.,
Republic Bidg., Cleveland 1, Ohio.
Revere Copper & Bross Inc., 230 Park Ave.,
New York, N. Y.

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Steel & Wire Co., Div. U. S. Steel
Corp., Rockefeller Bldg., Cleveland, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa. port, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
Holliday, W. J., & Co., Hammond, Ind. (Continued on page 440)

Finish stainless steel welds

faster and at lower cost

with job-engineered

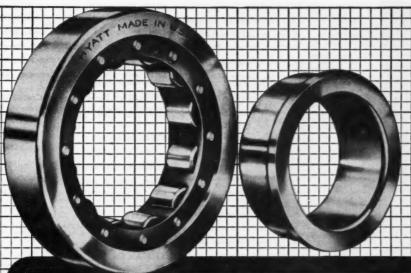
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Specifically designed for specific applications!

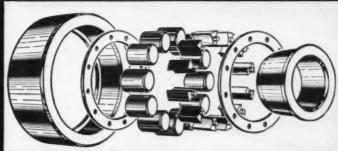
Finish stainless steel welds in half the former time, increase tool life 400 to 800 per cent with FORD'S Job-engineered Carbide Cutters. New flute design gives better finish, cuts faster at higher speeds. High nickel and chrome content of stainless steel make other cutters ineffective long before FORD Carbides are dulled. FORD Carbides will cut production time and tool costs.

Write for details and prices!

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High Capacity
Bearings...



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THE R-WB type of Hyatt Hy-Load is a two-part roller bearing with a single flanged, separable inner race. Rollers are retained by a conforming bar cage and flanges at both ends of the outer race.

Painstaking attention to all construction details such as flange squareness on races, uniformity of roller diameters, lengths and end squareness, plus high surface finishes, results in quieter-operating, longer-lasting bearings. The construction of this bearing provides heavy load-carrying capacity; smooth, quiet performance and permits high-

speed operation.

Flanged races on these bearings provide for endwise shaft location and accommodate light or intermittent thrust in one direction. When used in pairs they can locate shafts or carry light thrust in either direction.

Proper bearing application can improve the equipment you are designing or building. Be sure of your bearings. Consult your Hyatt Catalog or write for further information. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

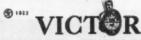


Whatever your metal cutting prob-lem, VICTOR "Moly"® High Speed Power Blades will cut your initial blade cost 15%, and give you the additional economy of more efficient

Quality makes VICTOR Blades industry's preference-top-quality, carefully heat-treated steel, fabricated on specially designed equipment, to give you fast, economical cutting and long blade life. Send for the free VICTOR Metal Cutting Booklet which tells you how to pick 'em-Gold "Moly"® High Speed or Silver Unbreakable High Speed.

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VICTOR "Moly" High Speed Power Blades are always sold through the recognized Industrial Distributor because he is closest to your problems. You know and have confidence in him, and he can give you delivery from stock where and when you want it.



SAW WORKS, INC. . MIDDLETOWN, N.Y., U.S.A. Makers of Hand and Power Hack Saw Blades, Frames and Metal Cutting Band Saw Blades

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Republic Steel Corp., Republic Bldg., Cleveland
1, Ohio.

Nepublic Steel Corp., Republic Blag, Cleveland, Ohio.

Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.

Timken Roller Bearing Co., Canton, Ohio.

U. S. Steel Corp. (American Steel & Wire Co. Div., Carnegie-Illinois Steel Corp. Div., Columbia Steel Co., Div., Tennessee Coal, Iron & R. R. Co., Div.), 436 7th Ave., Pittsburgh, Pa.

U. S. Steel Supply Div., U. S. Steel Co., 208 S. La Salle St., Chicago 4, III.

Wheelack-Lovejoy & Co., Inc., Cambridge, Mass.

### STEEL, Cold Drawn

Allegheny Ludium Steel Corp., Pittsburgh, Pa. American Steel & Wire Co., Div. U. S. Steel Corp., Rockefeller Bldg., Cleveland, Ohio. Bethiehem Steel Co., Bethiehem, Pa. Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y. Firth Sterling Steel & Carbide Corp., McKeesport. Pa.

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
LaSalle Steel Co., Hammond, Ind.
Republic Steel Corp., Union Drawn Steel Div.,
Massillon, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
U. S. Steel Corp., (American Steel & Wire Co.
Div.), 436 7th Ave., Pittsburgh, Pa.
Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.

### STEEL, High Speed Tool

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Armstrong Bros. Tool Co., \$200 W. Armstrong
Ave., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bidg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Republic Steel Corp., Republic Bidg., Cleveland
1, Ohio. 1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, III.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

### STEEL, Machine

STEEL, Machine

Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Holliday, W. J., & Co., Hammond, Ind.
LoSalle Steel Co., Hammond, Ind.
Republic Steel Corp., Republic Bldg., Cleveland
J. Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
Wheelock, Loveloy & Co., Inc., Cambridge, Mass.

### STEEL, Stainless

Allegheny Ludlum Steel Carp., Pittsburgh, Pa.
American Steel & Wire Co., Div. U. S. Steel
Corp., Rockefeller Bldg., Cleveland, Ohlo.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Firth Sterling Steel & Carbide Corp., mcneed-port, Pa., port, Pa.,

### STEEL, Strip and Sheet

STEEL, Strip and Sheet
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Steel & Wire Co., Div. U. S. Steel
Corp., Rockefeller Bidg., Cleveland, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St.,
New York 13, N.,
Republic Steel Corp., Republic Bidg., Cleveland
1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Solor Steel Corp., Union Commerce Bidg.,
Cleveland, Ohio.
U. S. Steel Corp. (American Steel & Wire Co.
Div., Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron &
R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.

STEEL, Tool and Die

Allegheny Ludium Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., Reading, Pa.
Firth Sterling Steel & Cerbide Corp., McKeesport, Pa.
Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Solar Steel Corp., Cleveland, Ohio.

STEEL, Zinc, Tin and Copper Coated Strip Allegheny Ludium Steel Corp., Pittsburgh, Pa. Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.

### STEEL ALLOYS

See Alloys, Steel.

STEEL BARS-See Bars, Steel.

### STEEL STOCK GROUND FLAT

Brown & Sharpe Mfg. Co., Providence, R. I. Starrett, The L. S., Co., Athol, Mass.

### STELLITE

Haynes Stellite Div., Union Carbide & Carbon Corp. (Alloy), 30 E. 42nd St., New York, N. Y.

### STOCKS, Die

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.
Butterfield Div., Union Twist Drill Co., Derby Line, Vt., Mfg. Co., Div. Union Twist Drill Co., Monsfield, Mass. Greenfield Top & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Moss.
Pratt & Whitney, West Hartford 1, Conn. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio. land, Ohio. nreadwell Tap & Die Co., 16 Arch St., Green-Threadwell Infield, Mass

### STONES, Oil or Sharpening

Bay State Abrasive Co., Westboro, Mass. Carborundum Co., Buffalo Ave., Niagara Falls, N. Y. Norton Co., 1 New Bond St., Worcester 6, Mass.

### STOOLS

Standard Pressed Steel Co., Jenkintown, Pa.

Rahn Granite Surface Plate Co., 637 N. West-ern Ave., Dayton, Ohio. Starrett, The L. S., Co., Athol, Mass.

### STRAIGHTENERS, Flat Stock and Wire

Nilson, A. H., Mch. Co., 1506 Railroad Ave., Bridgeport, Conn. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

### STRAIGHTENING MACHINERY

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio. Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Colonial Broach Co., Detroit 13, Mich.
Columbia Machinery & Engineering Corp.,
Hamilton 1, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,
III. III.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gilead, Ohio.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.
Lake Erie Engrg. Corp., Kenmore Statlon,
Buffalo, N. Y.
Morse Twist Drill & Mch. Co., New Bedford, 111.

### Springfield Mch. Tool Co., Springfield, Ohio. Watson-Stillman Co., Aldene Rd., Roselle, N. J. STRIPPING UNITS, Die

Wales-Strippit Corp., North Tonawanda, N. Y.

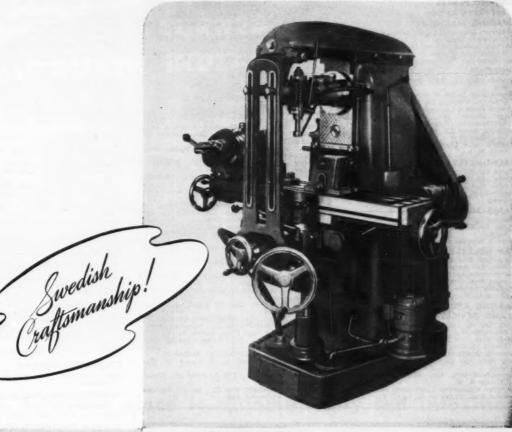
### STUD SETTERS

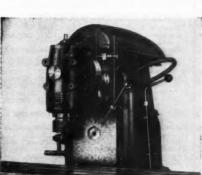
Errington Mechanical Laboratory, Inc., 24 Nor-wood Ave., Stapleton, S. I., N. Y. Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, III.

Waltham Machine Works, Newton St., Wal-tham, Mass.

### SUPERFINISHING MACHINES

Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis. (Continued on page 442)





Sajo Vertical Milling Attachment

The Sajo "Plain" Milling Machine



exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U.S. inch system.

★ Standard Equipment includes: 3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb-milling, 1" arbor, arbor support brace.

★ Extra Equipment: Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

### CONDENSED SPECIFICATIONS

Table Size41½" x 9½"
Longitudinal travel: Plain Miller 24%"
Universal Miller 27%"
Transverse travel84"
Vertical travel 19"
12 spindle speeds 36-1540 RPM
Table feeds12
Taper in spindleNo. 40 NMT
Main motor 3 HP

Precision anti-friction bearings on spindle and gear shafts

One-piece column and base Net weight - 2200 lbs.

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See Plates, Surface

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Bradley Co., 1326 5. 2nd St., Milwaukee, Wis.
Electro-Snap Switch & Mfg. Co., 4218-30 West
Lake St., Chicago 24, Ill.
General Electric Co., Scnenectady, N. Y.
Micro Switch Div., Minneapolis-Honeywell
Regulator Co., Freeport, Ill.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
Shepard Niles Crane & Hoist Corp., Montour
Falls, N. Y.

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Bristol Co., Platts Falls, Waterbury, Conn. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y. Veeder-Root, Inc., 20 Sargent St., Hartford,

### TAPER PINS, Standard

Chicago Screw Co., Bellwood, III. Morse Twist Drill & Mch. Co., New Bedford, Mass. Pratt & Whitney, West Hartford 1, Conn.

### TAP HOLDERS

Burg Tool Manufacturing Co., 3743 Durango Ave., Los Angeles 34, Calif. Errington Mechanical Laboratory, Inc., 24 Nor-wood Ave., Stapleton, S. I., N. Y. Procunier Safety Chuck Co., 18 S. Clinton St., Chicago. III. Chicago, III.

### TAPPING ATTACHMENTS AND DEVICES

AND DEVICES
Avey Drilling Machine Co., 25 E. Third St.,
Covington, Ky.
Baker Bros., Inc., Station F, P. O. Box 101,
Toledo 10, Ohio.
Brown & Sharpe Mfg. Co., Providence, R. I.
Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor,
Mich.

Buhr Mch. Tool Co., 839 Buhr 31., Ann Albar, Mich. Commander Mfg. Co., 4233 W. Kinzie St., Chicago 4, Ill Errington Mechanical Laboratory, Inc., 24 Nor-wood Ave., Stapleton, S. I., N. Y.

Ettco Tool Co., Inc., 592 Johnson Ave., Brook-lyn, N. Y. Jarvis, Chas. L., Co., Middletown, Conn. Leland-Gifford Co., 1025 Southbridge St., Wor-cester, Mass. Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill. Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill. Thriftmaster Products Corp., 1076 N. Plum St., Lancaster, Pa.

### TAPPING MACHINES

Avey Drilling Machine Co., 25 E. Third St., Covington, Ky.
Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, Ill.
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.
Bodine Corp., 317 Mt. Grove St., Bridgeport, Conn.

Conn. Buffalo Forge Co., 490 Broadway, Buffalo. N. Y. Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor,

Mich.
Chailenge Mchry. Co., Grand Haven, Mich.
Cleveland Tapping Mch. Co., 1201 Camden
Ave., S. W., Canton 6, Ohio.
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.
Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.
Greenlee Bros. & Co., 12th and Columbia Aves.,
Rockford. Ill.

Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill. Hamilton Tool Co., 834 South 9th St., Hamil-ton, Ohio. Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.

Hill Acme Co., 1201 W. 65th 3t., Cleveland a., Ohio.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Jarvis, Chas. L., Co., Middletown, Conn.
Kaufman Manufacturing Co., Manitowoc, Wis.
Kingsbury Mch. Tool Corp., Keene, N. H.
Leland-Gifford Co., 1025 Southbridge St., Wor-

Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Molline Tool Co., 102 20th St., Molline, III.
Morris Machine Tool Co., 9 Harriet St., Cincinnati 3, Ohio.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.

Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill. Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill. Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

### TAPPING MACHINES, Nut

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio. National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.
Snow Mfg Co., 435 Eastern Ave., Bellwood, Ill.

### TAPS

Bath, John, Co., Inc., Worcester, Mass. Besly-Welles Corp., Beloit, Wis. Butterfield Div., Union Twist Drill Co., Derby Besty-verties (Cop.), Besty Viss.

Butterfield Div., Union Twist Drill Co., Derby Line, Vt.

Card, S. W., Mfg. Co., Div. Union Twist Drill Co., Mansfield, Mass.

Continental Tool Works, Div. Ex-Cell-O Corp., Detroit 7ap & Tool Co., Detroit, Mich.

Geometric Tool Co., Detroit, Mich.

Geometric Tool Co., Westville Station, New Haven 15, Conn.

Greenfield Tap & Die Corp., Greenfield, Mass.

Hy-Pro Tool Co., 100 Mt. Pleasant Ave., New Bedford, Mass.

Landis Mch. Co. (Solid Adjustable), Waynesboro, Pa.

Morse Twist Drill & Mch. Co., New Bedford, Mass. Mass Pratt & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohlo. Standard Tool Co., 3950 Chester Ave., Cleve-

Iand, Ohio.

Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.
Winter Bros. Co., Rochester, Mich.
Wood & Spencer Co., 1930 E. 61st St., Cleveland, Ohio.

### TAPS, Collapsing

Geometric Tool Co., Westville Station, New Haven 15, Conn. Landis Mch. Co., Waynesboro, Pa. National Acme Co., 170 E. 131st St., Cleveland, Ohio. Sheffield Corp., 721 Springfield, Dayton, Ohio.

### TELESCOPES, Alignment

Engis Equipment Co., 431 S. Dearborn St., Chicago 5, III.

### THERMOMETERS, Indicating and Recording

Bristol Co., Platts Mills, Waterbury, Conn.

### THREAD CUTTING MACHINERY

Brown & Sharpe Mfg. Co., Providence, R. 1.
Cleveland Tapping Mch. Co., 1201 Camden
Ave., S. W., Canton 6, Ohio.
Cosa Corp., 405 Lexington Ave., New York 17,
N. Y.
Davis & Thompson Co., 6411 W. Burnham St.,
Milwoukee 14, Wis.
Eastern Mch. Screw Corp., New Haven, Conn.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Grapt Mfg. & Mch. Co., 20 Silliman St., Bridge-

Grant Mfg. & Mch. Co., 90 Silliman St., Bridge-port 5, Conn. Hill Acme Co., 1201 W. 65th St., Cleveland 2,

Ohio.

Ohio.

Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.

Kaufman Manufacturing Co., Manitowoc, Wis.

Landis Mch. Co., Waynesboro, Pa.

Pratt & Whitney, West Hartford 1, Conn.

Procunier Safety Chuck Co., 18 S. Clinton St.,

Chicago, III.

Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, III.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Rogers Machine Works, Inc., Buffalo 10, N. Y. Snow Mfg. Co., 435 Eastern Ave., Bellwood, III.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

### THREAD CUTTING TOOLS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.
Detroit Tap & Tool Co., Detroit, Mich.
Eastern Mch. Screw Corp., New Haven, Conn.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Geometric Tool Co., Westville Station, New Haven, 15 Conp. field, VT.
Geometric Tool Co., Westville Station, New
Geometric Tool Co.,
Haven 15, Conn.
Gorham Tool Co., 14400 Woodrow Wilson,
Detroit, Mich.,
Hill Acme Co., 1201 W. 65th St., Cleveland 2,

Hill Acme Co., 1201 W. 65th St., Clevelune J., Ohio.
Landis Mch. Co., Waynesboro, Pa.
Landis Mch. Co., Waynesboro, Pa.
Prott & Whitney, West Hartford 1, Conn.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.
Williams, J. H., & Co., 400 Vulcan St., Buffale
7, N. Y.
(Continued on page 444)

(Continued on page 444)

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### TURNER AUTOMATIC INDEXING MACHINE



drills, chamfers and reams
600 piston rod ends
per hour!

STATION NO. 1, hopper-fed automatic loading and cam-clamping

STATION NO. 2, drill 7/16" hole 1/4" deep

STATION NO. 3, drill 7/16" hole through

STATION NO. 4, electric check 7/16" hole

to determine if hole is through

STATION NO. 5, chamfer inside of hole

STATION NO. 6, chamfer opposite side

STATION NO. 7, ream .4385-.440" hole

STATION NO. 8, unload; automatic air ejected

### Here is how the piece is automatically fed into the Turner Machine and ejected in one complete cycle

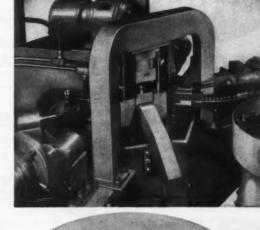
The view of the opposite side of the Turner Indexing Machine with the Model 24-B Turndex shows the pieces coming from the syntron hopper and being fed into the automatic loading device. The pieces are then taken from the loader into the fixture. After the piece is placed in the fixture it is automatically clamped in place by means of a cam attached to the Turndex Indexing Table.

When the pieces come to the unloading station, each piece is automatically unclamped and an air cylinder mounted above and attached to a chute picks the piece out of the fixture and automatically ejects it into a tote pan.

The "brain" of the Turner Machine is the
Model 24-B Turndex Indexing Table



Developed under an entirely new principle, the Turndex Indexing Table offers a combination of accuracy, speed, smoothness, power and versatility never before achieved by the commonly accepted types of indexing tables. For complete details about this table and the special machines, jigs and fixtures write us today.



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THREAD GAGES

See Gages, Thread.

THREAD GRINDING MACHINES See Grinding Machines, Thread.

THREAD MILLING MACHINES Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Pratt & Whitney, West Hortford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio. Wotham Machine Works, Newton St., Waltham, Mass.

THREAD ROLLING ATTACHMENTS
Salvo Tool & Engineering Co., 26441 Gratlot
Ave., Roseville, Mich.

THREAD ROLLING MACHINES Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
V & O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y.

TIN AND TERNEPLATES Bethlehem Steel Co, Bethlehem, Pa. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio. Oh 1, Ohio.
slor Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
S. Steel Corp. (Carnegie-Illinois Steel Corp.
Div., Columbia Steel Co. Div., Tennessee
Coal, Iron & R. R. Co., Div.), 436 7th
Ave., Pittsburgh, Pa

Ave., Pittsburgh, Pa

TOOL BITS, High Speed Steel
Allegheny Ludium Steel Corp., Pittsburgh, Pa.
Armstrong Bros. Tool Co., 5200 W. Armstrong
Ave., Chicago, Ill.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co., of America, Chrysler Bldg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson,
Detroit, Mich.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago I8, Ill.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Williams, J. H., & Co., 400 Vulcan St., Buffalo
7, N. Y.

TOOL BITS, Special Alloy
Alloghery Ludium Steel Corp., Pittsburgh, Pa.
Cleveland Twist Drill Co., 1242 E. 49th St.,
Cleveland, Ohio.
Firth Sterling Steel & Carbide Corp., McKeesport. Pa.

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.
Kennametal, Inc., Latrobe, Pa.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.

TOOL GRINDERS

See Grinding Machines for Sharpening, Turning and Planing Tools.

TOOL HOLDERS Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn. Armstrong Bros. Tool Co., 5200 W. Armstrong

Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Con.,
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.
Blake, Ed., Co., 442 Cherry St., West Newton 65, Mass.
Burg Tool Manufacturing Co., 3743 Durango Ave., Los Angeles 34, Calif.
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.
Lovejoy Tool Co., Inc., Springfield, Vt., Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Millholland, W. K., Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind.
Portage Double Tool Co., 1036 Sweitzer Ave., Akron 11, Ohio.
R and L Tools, 1825 Bristol St., Philadelphia 40, Pa.
Warner & Swasey Co., 5701 Carnegle Ave., Cleveland 3, Ohio.
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.
Williams, J. H., & Co., 400 Vulcan St., Buffolo 7, N.Y.
TOOLMAKERS' INSTRUMENTS

TOOLMAKERS' INSTRUMENTS
Ames, B. C., Co., Waltham 54, Mass.
Brown & Sharpe Mfg, Co., Providence, R. I.
Scherr, George, Co., Inc., 200 Lafayette
New York 12, N. Y.
Starrett, The L. S., Co., Athol, Mass.

Allegheny Ludium Steel Corp., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa. Carpenter Steel Co., Reading, Pa. Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y. TOOL STEEL

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.

Republic Steel Corp., Republic Bidg., Cleveland 1, Ohio.

Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.

Solar Steel Corp., Union Commerce Bidg., Cleveland, Ohio.

TOOLS, Carbide-Tipped
Adamas Carbide Corp., 999 South 4th St., Harrison, N. J.
Aliegheny Ludium Steel Corp., Pittsburgh, Po. Atrox Co., Newington, Conn.
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa. port, Page 1 a Carolde Corp., McKees-port, Page 2 a Carolde Corp., McKees-port, Page 3 a Carolde Corp., McKeen-Detroit, Mich. Colonial Broach Co., Detroit 13, Mich. Kennametal, Inc., Latrobe, Pa. Metal Carbides Corp., Youngstown, Ohio. Morse Twist Drill & Mch. Co., New Bedford, Mass. Merse Twist Drill & Mcn. ..., Mass. Severance Tool Industries, Inc., 636 Iowa Ave., Saginaw, Mich. Super Tool Co., 21650 Hoover Rd., Detroit 13,

Sagnram,
Super Tool Co., 21030
Mich.
Union Twist Drill Co., Athol, Mass.
Willey's Carbide Tool Co., 1340 W. Vernor
Hwy., Detroit 1, Mich.
Shaper and Planer
Dittaburgh, Pa. Hwy, Detroit 1, Mich.

TOOLS, Lathe, Shaper and Planer
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Shelton, Conn.
Armstrong Bros. Tool Co., 5200 W. Armstrong
Ave., Chicago, Ill.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Carboloy Dept., General Electric Co., Box 237,
Roosevelt Park Annex, Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson,
Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon
Corp., 30 E. 42nd St., New York, N. Y.
Kennametal, Inc., Latrobe, Pa.
Lovejoy Tool Co., Inc., Springfield, Vt.
Northwestern Tool & Engrg. Co., 117 Hollier,
Dayton, Ohio.
Super Tool Co., 21650 Hoover Road, Detroit 13,
Mich.
Worner & Swasey Co., 5701 Carnegie Ave.,
Cleveland 3, Ohio.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.
Williams, J. H., & Co., 400 Vulcan St., Buffalo
7, N. Y.
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TRANSFER MACHINES, Automatic
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Rockford, III.
Colonial Broach Co., Detroit 13, Mich.
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.
Ex-Cell-O Corp., 1200 Oakman Blyd., Detroit
32, Mich.
Sundstrand Mch. Tool Co., 2531 11th St.,
Rockford, III.

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Reliance Elec. & Engrg. Co., Collinwood Station, 1088 Ivanhoe Rd., Cleveland, Ohio. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

TUBE FLANGING MACHINES Grant Mfg. & Mch. Co., 90 Silliman St., Bridge-port 5, Conn.

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Ave., W., Chicago, III.
Yoder Co., 5500 Walworth Ave., Cleveland,
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TUBE TESTING AND EXPANDING MACHINES
Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

TUBING, Aluminum Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa.

TUBING, Brass and Copper American Brass Co., 25 Broadway, New York, N. Y. N. Y. Chose Brass & Copper Co., Inc., 1949 Rodney St., Waterbury 20, Conn. Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

TUBING, Flexible
American Metal Hose Br. American Brass Co.,
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Titeflex, Inc., 500 Frelinghuysen Ave., Newark
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(Continued on page 446)

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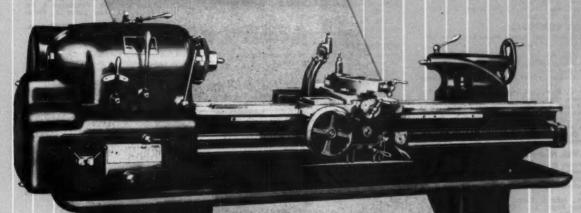
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Swing Over Saddle	12"	91/2"	9"	
Dia, of Face Plate	16"	14"	12"	
Spindle Bore	3-1/16"	2-1/16"	1-9/16"	
Max. Collet Capacity	2" Dia.	2" Dia.	1" Dia.	
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Timken Roller Bearing Co., Canton, Ohio.
U. S. Steel Corp., National Tube Co. Div., 436 7th Ave., Pittsburgh, Pa.

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Mead Specialties Co., 4114 North Knox Ave.,
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35, Mass. 35, Mass. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill. Watson-Stillman Co., Aldene Rd., Roselle, N. J.

VIBRATION INSULATION

### American Felt Co., Glenville, Conn.

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Armstrong Bros. Tool Co., 5200 W. Armstrong
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Brown & Sharpe Mfg. Co., Providence, R. I.
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614G N. Lexington Ave., Pittsburgh 8, Pa.
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Hendey Mch. Co., Tarringtan, Conn. Logansport Machine Co., Inc., Logansport, Ind.

Martin, J. E., Mch. Works, 548 W. State St., opringtield, Ohio Neise, Karl A., Dept. M., 381 Fourth Ave., New York 16, N. Y. Producto Mch. Co., 990 Housatonic Ave., Bustagnate Company Producto Mch. Co., 990 Housatonic Ave., Bridgeport, Conn. Skinner Chuck Co., 344 Church St., New Britain, Conn.

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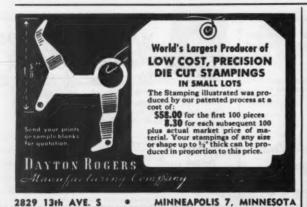
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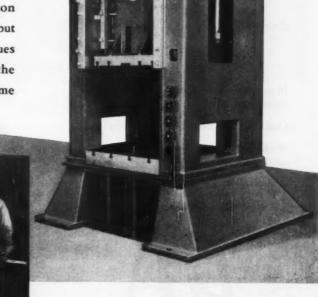
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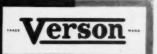
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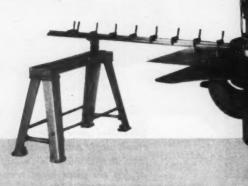
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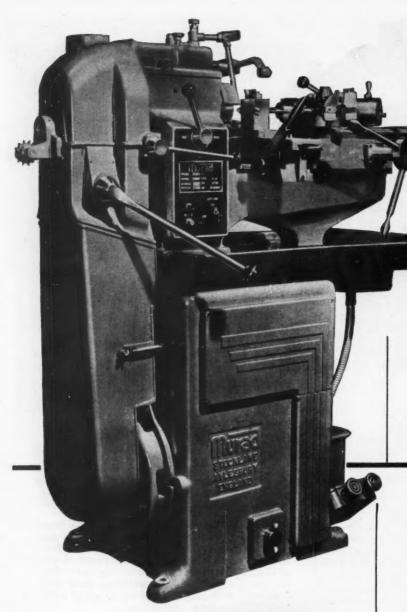
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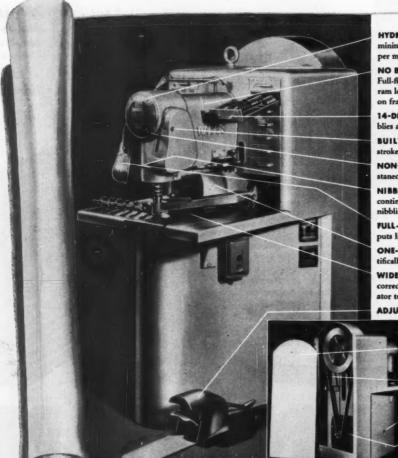
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ONE-PIECE STEEL CASTING FRAME is scientifically designed to have maximum rigidity.

WIDE, UNOBSTRUCTED BED TABLE is at the correct height for easy feeding or for the operator to sit down.

ADJUSTABLE FOOT TRIP MECHANISM pro-

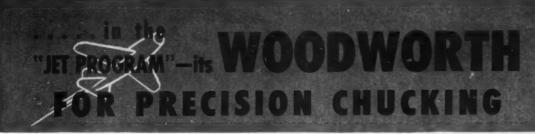
vides dual control for use when both hands are required to feed the work.

FULL-SIZE DOOR provides unobstructed accessibility to rear of press.

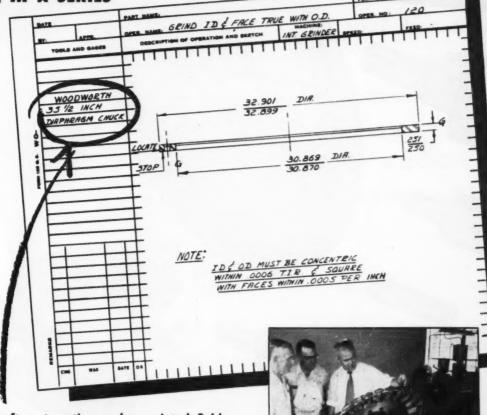
MULTI V-BELT DRIVE from motor pulley to flywheel.

SLUG CLEARANCE TUBE directs slugs to an out-of-way container.

MOTOR MOUNT adjustable to take up slack in V-belts.



### No. 2 IN A SERIES



The aircraft, automotive and associated fields recognize Woodworth as "headquarters" for the best precision chucking. So for the best solution to your precision chucking problems . . . send part print and machining information to Woodworth.



Accuracy you can trust

N. A. WOODWORTH: CO., 1300 EAST NINE MILE ROAD + DETROIT 20, MICHIGAN PRECISION GAGES . DIAPHRAGM CHUCKS AND ARBORS . CONE-LOK JIGS





TURNING TOOL • TAP AND DIE HOLDER • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER • RECESSING TOOL RELEASING ACORN DIE HOLDER • REVOLVING STOCK STOP • FLOATING DRILL HOLDER • KNURLING TOOL • CARBIDE AND ROLLER BACKRESTS



Van Keuren

MEASURING ROLLS

are just the thing for the precise measurement of

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### INSPECTION SET NO. 17 MEASURING ROLLS, complete in Mahogany Case \$212.75

Set No. 17 contains 2 rolls each of sizes:

.050 .0625 .100 .125 .150 .1875 .200 .250 .300

.400 .500 .600 .700 .750 .800 .900 1.000

All rolls are 1" long and are guaranteed to be within .00002" for roundness, straightness and exact size.

Complete details on this and other Precision Measuring Tools are given in the Van Keuren 1952 Catalog and Handbook No. 35.

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THE JAN KONTON

CO.

178 WALTHAM STREET, WATERTOWN, MASS.

33rd YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires



BATAVIA CLAMP CO., makers of eccentric and C-clamps, bought a 50 ton motor driven KRW Hydraulic Press to do one job - set rivets in the heads of eccentric clamps. Then, like hundreds of manufacturers, they found they had gotten much more than they bargained for. They had been having trouble with loosening of T-handles on their C-clamps. Their new KRW Press offered this solution: Drill the pin hole 1/64" undersize and drive the pin in place with the Press. It worked like a charm. Straightening C-clamps that bent as they cooled, resizing distorted plungers and straightening distorted cams and feet on eccentric clamps — these are just a few of the production bottlenecks remedied by their KRW Hydraulic Press.

YOU'D be surprised how many ways a KRW Hydraulic Press can save you money on your operations. Available in 25 to 150 ton capacities, one, two or three cylinder models, KRW Hydraulics are the most versatile presses on the market. Easily converted in minutes from one set-up to another. Self-contained above ground, they come in motor, air or hand operated types. Check with your machinery dealer or get in touch with us in Buffalo. Write, wire or phone Dept. 15.

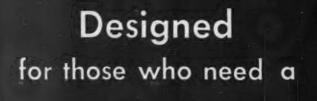


215 MAIN STREET



Designers...
Designers...

Be about for a part triple play by asking to your rates appeal to your factured, also many factured by histories factured by histories fortestial with only one set of dies. This can be accomplished with MADISON-KIPP ZINC AND ALUMINUM DIE CASTINGS This housing is an important component of a Dole Automatic Register for forced warm air heating systems. It is a good example of what can be done in Aluminum with the special Madison-Kipp high pressure die casting process. Please send all inquiries regarding die castings to our home office in Madison. MADISON-KIPP CORPORATION 203 WAUBESA STREET . MADISON 10, WIS., U.S.A



MGHT-

Machine

### -that's the WALKER-TURNER line

For jobs where neither the capacity nor expense of a heavy industrial machine is warranted, and where a "hobby machine" would be wholly inadequate, Walker-Turner has engineered a special class of light-heavyweight power tools.

Professional in design and operation, yet light for production machines, the Walker-Turner "in-between" line gives industry the capacity needed for short-run production work, without the necessity of heavy investment. For complete information, write your name and address in the margin below.

### WALKER TURNER

KEARNEY AND TRECKER CORPORATION

DRILL PRESSES . RADIAL DRILLS . TILTING ARBOR SAWS BELT and DISC SURFACERS . METAL-CUTTING BAND SAWS LATHES . SPINDLE SHAPERS . JOINTERS

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### . Use this space.

to write for full details and specifications Walker-Turner Division, Kearney & Trecker Cerp. Dept. T9, Plainfield, N. J.

(Please write your name and address in margin of page)

# NEWEST LIGHT-HEAVYWEIGHT 15" WALKER-TURNER DRILL PRESS WITH 6" SPINDLE TRAVEL

Designed for fast, accurate drilling at new low levels of invalidation. Capacity: Bench Models—12 clibrated depth indicator. Capacity: Bench Models—12 chuck to table, 17½ thuck to base. 10 12½ totale. Six spline spindle and 5000 r.p.m. with 1750 r.p.m. motor. Available in bench, for and multi-spindle models.

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SHARKET PLACE OF THE

the greatest

SHOW

of its kind

under the sun...



metal show

MACHINERY, October, 1952-459



Assembly speed is doubled using Multipress to crimp a small brass contact to pentype flashlight cases



20,000 mop clamps a day is cost-cutting speed of 35ton Multipress using roll-feed and 4-stage dies



Dies stay sharp twice as long when Multipress is used in trimming flash and gate from die castings



Scrap losses drop sharply as Multipress doubles staking speed on high precision voting-machine counter wheel



Six hours saved on every 100 finished units as famous electric cleaner plant adopts Multipress to clean cast housings



Output is boosted by 100% by famous toy train maker, staking 6-part assembly together with Multipress



At twice the speed of previous method, Multipress assembles bolts on electrical insulator holders



1600-per-hour rate slashes production costs when 4-ton Multipress is used to broach serrations on small cams



No down-time for repairs in 7 years for Multipress used to bend tabs and arch locks on steel clamps at high speed



Speed doubled on delicate job of drawing thin phosphorbronze tubes used in forming sensitive thermostat bellows



Less operator fatigue noted as Multipress Midget assembles two check valves to main valves at 450 per-hour



In only four stages, Multipress deep-draws a precision ordnance part formerly requiring 8 draws

## Speaking of Trends... MULTIPRES

Thousands of actual Multipress installations prove that its smooth, oil-hydraulic power control is the surest answer to growing demands for faster production, better quality control, quicker tool changing, safer operation, and lower scrap losses.

It offers complete, stepless adjustability of ram speed, pressure and stroke length. Manual and automatic models in a complete range of sizes and capacities up to 50 tons.

Pressures build up instantly after the ram contacts the work. There's no hammer-blow impact on either the work or tooling.

With Multipress Index Table Feeds, parts or assemblies can be loaded on fixtures at several points

around the table dial — by two or more operators, if necessary. The fixtures index automatically under

Automatic time delay, for ram dwell or hold-down needs, is easily provided with Multipress.

the press ram at speeds up to 70 per minute.

In fact, Multipress offers such a wide choice of valving, ram controls, auxiliary feeds, operating accessories, and tooling attachments—all easily interlocked with the press ram action—that it has become one of industry's most versatile tools for low-cost production and assembly.

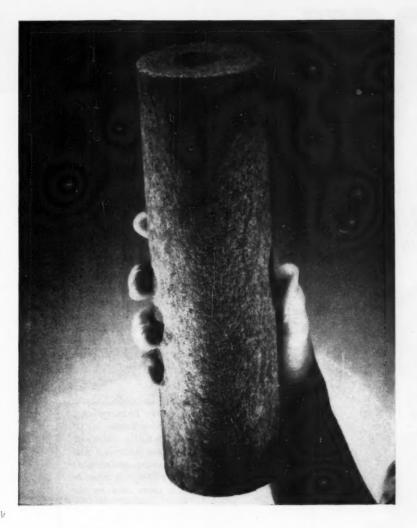
Write for complete Multipress information today.

### The DENISON Engineering Company

1152 Dublin Road, Columbus 16, Ohio



DENISON Hydrollics



# The <u>Simplest Filter Cartridge</u> Lasts the Longest...Twice as Long

Cartridge renewals are cut at least in half when Cuno MICRO-KLEAN replaces any other filter. And throughout its service life, MICRO-KLEAN is guaranteed for specific performance.



Removes More Sizes of Solids from More Kinds of Fluids

Strain fuels, lubricants, process fluids, etc.—AUTO-KLEAN Filter fuels, lubricants, process fluids, etc.—MICRO-KLEAN Clean raw water, recirculating water, etc.—FLO-KLEAN

Fluid Conditioning

### Less Expensive Micronic Filter Saves Space . . . Works Mechanically

For fluid filtration in the micronic range, many designers are now specifying Cuno MICRO-KLEAN.

In many cases, the MICRO-KLEAN turns out to be the most efficient—as well as the most economical—method of filtering many fluids.

The MICRO-KLEAN cartridge is a simple, compact structure of "felted" fibres, with no internal or external supports to take up space and complicate installation. It gets its strength from the resinous impregnation and polymerization. It won't swell or shrink, soften or harden, rupture or channel, or otherwise release contaminants into the discharge flow.

### Fewer cartridge changes

MICRO-KLEAN's greater dirtholding capacity comes from maximum porosity (85-90%) and from its exclusive "graded density in depth", permitting smaller particles to penetrate further, rather than "loading" the surface.

Cuno MICRO-KLEAN handles a wide range of fluids and flow rates with low pressure drop. It is guaranteed to remove 100% of all solids for which it is rated plus a large percentage down to 1 micron.

Capacities: a few to over 800 gpm. Single or multiple cartridge units. External or built-in application.

Cuno Engineering Corporation Sept. 131C, South Vive Street, Meriden, Conn	ė.
Please send information on Cuno MICRO-KLEA	N
for following installations	0
Name	
Company	a
Address	۰
CityZone,State	

MACHINERY, October, 1952-461

# THE SELF-TAPPING SCREWS STILL WITH ASSEMBLY EXPERTS





"Screws are something like people. If they lose their heads under pressure—if they turn out to be 'softies'—if they don't 'square up', they can slow up a job for sure. We avoid that by specifying Parker-Kalon."



"P-K has developed many types of Self-tapping Screws, and their long experience covers millions of applications. For that reason we know their recommendations will fit the right type screw to the job, and not fit the job to some particular type of screw."



"There's a 'best buy' in everything, and in Self-tapping Screws we've found it's Parker-Kalon. Hardness and toughness are balanced just right, size is accurate, and threads are sharp and clean from head to tip. And that saves time on the assembly line . . . plenty!"

PROMPT DELIVERIES NOW FROM YOUR LOCAL P-K DISTRIBUTOR

### GET THIS BOOKLET

Tells "where to use what" type of screw in all types of metals and plastics, gives hole-size recommendations and other information. Ask your P-K Distributor for Form 480. Or, write Parker-Kalon Corporation, 202 Varick Street, New York 14.



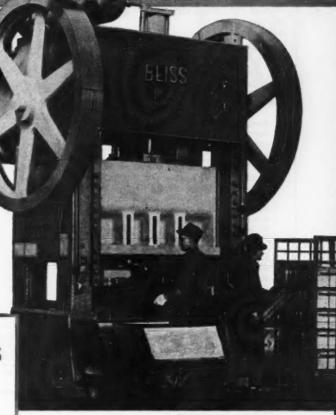


The Original SELF-TAPPING SCREWS

AND OTHER FASTENING DEVICES



# The trend is to more stampings



95% of presses of this leading desk maker are Bliss-Built!

NEW 250-TON PRESS is typical of modern Bliss installations at Corry-Jamestown Mfg. Corp. This straight-side press features a sturdy box-frame construction and extra-long slide adjustment.

When it comes to making steel office desks and files, Corry-Jamestown Mfg. Corp., Corry, Pa., is an acknowledged leader. And when it comes to choosing press equipment, Corry naturally turns to the leader in the press field-Bliss.

Throughout Corry-Jamestown's three plants, 95% of the presses are Bliss-Built. And in its newest plant, 100% of the presses over 10-ton capacity are Bliss-Built.

Rugged Bliss Straight-Side and Inclinable Presses have helped Corry maintain high quality, speed production, and minimize costs of stampings for its "STEEL AGE" desks and files.

Your local Bliss sales engineer-the trained representative of the world's largest press builder-can show you why Bliss belongs in your press room. Remember, Bliss can supply the right press for a given job or a complete press room.

- E. W. BLISS COMPANY, CANTON, OHIO E. W. Bliss (England) Ltd., Derby, England
- E. W. Bliss Company (Paris), St. Ouen sur Seine, France

### PRESSES, ROLLING MILLS, SPECIAL MACHINERY

Branch effices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Terento, Genedo.
West Coast Representatives: Moore Machinery Company, Los Angeles and San
Francisco; Star Machinery Company, Seattle. Other dealers in United States cities and throughout the world.



BLISS ON YOUR PRESS IS MORE THAN A NAME...IT'S A GUA THAN A NAME...IT'S A GUARANTEE! Then you're looking for a machine that will MILL, DRILL, BORE and SHAPE at ALL ANGLES WITHOUT CHANGING SET UP

you're looking for the

# Bridgebort TURRET MILLING MACHINE

Here is a machine that die shops, tool rooms and production lines are keeping busy every day, saving time, conserving effort in handling countless jobs of all kinds in a way that the "BRIDGEPORT" and only the "BRIDGEPORT" makes possible.

The exclusive features of "BRIDGEPORT" performance are recognized and accepted wherever there are metal

working shops. That is why countless thousands of these machines are modernizing methods in tool rooms, die shops and production lines. Obviously, ability to drill, mill, bore and shape at all angles of the work without changing set up results in maximum machine time, minimum down time, and maintained accuracy through every operation. Modernization of your methods through instal-lation of "BRIDGEPORTS" pays on the investment are exceptionally

### CONDENSED SPECIFICATIONS

S Spindle Speeds from 80 to 2720 R.P.M.
Back Geared Spindle Drive Unit: utilizes full power at all speeds without belt slippage.
Quill Travel: 5"
Power Feed Quill in three steps: .0015, .003 and .006 in. per spindle revolution.
Spindle Brake and Lock for convenience in changing tools.
Collet Capacity: up to 3/4" diameter.



For milling and drilling at right angles. Used also for boring and reaming, cutting gears, hobs and broaches, saving and siliting.

Boring Tools and Holder previde the means of boring holes up to 6" diam-eter. Available for use on Bridgeport 1HP Milling, Drilling and Boring At-

### Bridgeport MACHINES, INC. Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines



Any Gilbert radial operator will tell you that the smooth, easy response of controls saves time, cuts down fatigue, and helps boost output. Furthermore, the operator has good visibility of the work without raising the head above a comfortable working height, because the spindle axis is close to the front face of the head.

Note clean, compact grouping of controls: (1) speed back gear, (2) speed and feed indicator, (3) head clamp lever, (4) speed change levers control 12 speeds; direct reading plate simplifies selection. (5) adjustable depth stop clamp, (6) spindle power feed is engaged by pulling any turnstile lever, (7) spindle reverse lever, (8) fine feed hand wheel, (9) head traverse hand wheel, (10) power feed engaging lever, (11) feed change levers provide six feeds (twelve with tap heads) shown on direct reading plate.

Ask your Gilbert representative for a demonstration, or write for Bulletin 349

### GILBERT

MACHINE TOOL COMPANY
3366 BEEKMAN ST. • CINCINNATI 23, OHIO

THOSE WHO BUY GILBERT BUY GILBERT AGAIN

MACHINERY, October, 1952-465



### Columbus Die-Tool

It takes the right machinery to build your product right!
Columbus Die-Tool individually designs and builds tools, dies, and special machinery to produce your product alone. This gives you the advantages of lower operating cost, greater production and a higher quality product.

Let Columbus Die-Tool's more than 46 years of designing and engineering experience go to work for you. Contact CDT today about your special die, tool and machinery requirements.



### CHALLENGE Precision SURFACE PLATES

and Equipment

### ON EXHIBIT AT BOOTH 932

NATIONAL METAL EXPOSITION PHILADELPHIA - OCTOBER 20-24



Available either precision ground or planer finished, Challenge Layout Surface Plates offer a perfectly smooth, squares surface for layout, inspection or assembly line operations. Sizes range from 12" x 18" to 54" x 144". All are built of special analysis semi-steel. The all-steel stand is arc-welded to furnish the rigidity of a one-piece unit. Special leveling screws enable the user to level the plate quickly and to lock it securely.



For Accurate Lapping of Delicate Joints. Assures perfect fit when lapping metal-to-metal joints on which no sealer is used. Ideally suited for use on parts which must be lapped perfectly to avoid oil leaks. Plates have \$\frac{1}{16}"\$ grooves \$\frac{1}{2}"\$ apart.



Semi-steel WELDING TABLE

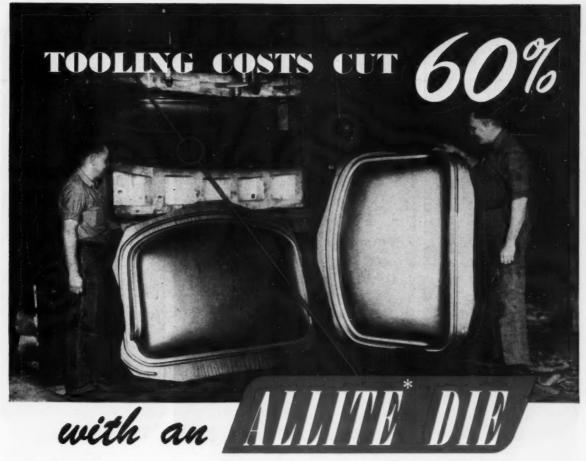
The Challenge Welding Table illustrated above provides a true, rigid surface with Tee-Slots to facilitate assembling, localing and welding. It is built of fine grain special analysis semi-steel in three standard sizes: 30 x 60", 48 x 96", and 54 x 144"; other sizes to order.

#### THE CHALLENGE MACHINERY COMPANY

Office, Factories



Grand Haven



Here is an example of how Allite Dies show worthwhile savings.

A truck manufacturer required approximately 100 experimental roof panels. A three-piece Allite Die was built for the job. This die cost only 40% of what would have been required if an iron die had been used. Of equal importance to the customer, a zinc alloy die such as this is produced quickly, and its accuracy provides the true die conditions and performance that are usual in high production tooling. While nearly 100 stampings were drawn with this particular die, several thousand more could have been produced before any appreciable wear resulted.

If you have need for experimental or short-run dies, it can be to your advantage to give serious consideration to Allite Dies—produced by Richard Brothers Division where plaster pattern, modern foundry, and extensive die shop

facilities are fully coordinated. Why not write today for full information.

\*ALLITE DIES are accurately cast for low cost tooling. The material used is any formula of zinc alloy (Kirksite, Formaloy, etc.) which meets your requirements.

### Other Allied Products

HARDENED AND PRECISION
GROUND PARTS • SPECIAL COLD
FORGED PARTS • STANDARD
CAP SCREWS • SHEET METAL
DIES FROM THE LARGEST TO THE
SMALLEST • JIGS • FIXTURES
R-B INTERCHANGEABLE PUNCHES
AND DIES



### ALLIED PRODUCTS CORPORATION

DEPT. D-8 . 12619 BURT ROAD . DETROIT 23, MICH.



PLANT 1 Detroit, Mich.



PLANT 2 Detroit, Mich.



PLANT 3 Hillsdale, Mich.



PLANT 4 Hillsdale, Mich.









Ohio Gear is setting New Standards—New Standards in quality and accuracy— New Standards in uniform precision-New Standards in every detail of workmanship.

Whether it is a single gear, sprocket or speed reducer, an intricate drive, or precision engineering, you will find Ohio Gears and Reducers fit your specifications in every detail of material, machining, and finished dimensions. Call your nearest distributor or write direct.

ESTABLISHED 1915

THE OHIO GEAR COMPANY 1331 EAST 179th STREET . CLEVELAND 10, OHIO



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### WERNER

### MILLERS

From PIGMY Size 0 to GIANT 5

VERTICAL: Size 0 to 5
Table sizes 22"x7" up to 90"x20"

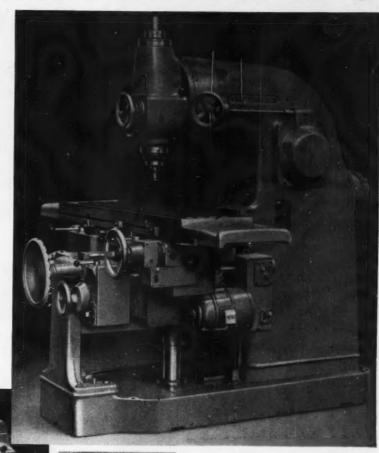
PLAIN: Size 0 to 4
Table sizes 22" x7" up to 76" x 151/2"

UNIVERSAL: Size 1 to 4
Table sizes 29" x 8" up to 76" x 15"

MANUFACTURING MILLERS: Sizes 1, 2, 3 2-19, 3-25



No. 0 Vertical



No. 4 Vertical

## PROMPT and REASONABLE DELIVERIES

For further information about these and other machines contact Dept. M

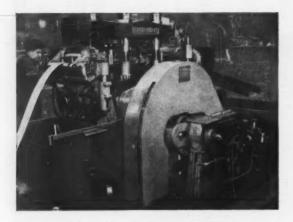
3-25 Manufacturing



MARAC MACHINERY CORP. 1819 B'WAY • N.Y. 23

MACHINERY, October, 1952-469

## Modernize Metal Stamping with Henry & Wright Dieing Machines



In Chrysler's Highland Park plant (above), Henry & Wright Dieing Machines are used to make fluid coupling fins and torque converter impeller blades. At Knapp-Monarch (below), Dieing Machines produce rotor and stator laminations complete-per-stroke.



### IT PAYS 3 BIG WAYS

- 1. Combine operations -- use progressive stamping more efficiently, for more parts
- 2. High quality work at high speed
- 3. High speed plus long die life

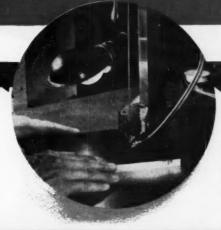
In Plant After Plant Henry & Wright Dieing Machines are setting new record highs in the number of pieces produced per hour, in work quality and die life. A high production tool, this unique press is proving that it can do as much work as five to ten conventional presses. It provides both high speed and long die life—a combination unavailable in any other press.

### Only the best is good enough

Capacities of Henry & Wright Dieing Machines range from 25 tons to 2500 tons pressure. Our catalog—available upon request—describes machines up to 400 tons. Larger capacities are custom built to requirements. Write Henry & Wright, 461 Windsor St., Hartford 5, Conn..



# Get a Longer Ron SIMONDS for your Money ... with SIMONDS METAL-GUTTING BAND SAWS

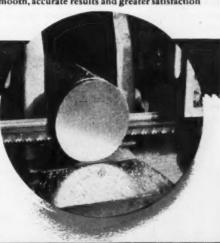


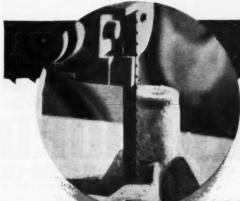
### ... for Contour Cutting

Made of tough, alloy steel that resists breaking, yet holds a keen cutting edge, Simonds Standard-Tooth Hard-Edge Band Saws in the narrower widths are outstanding favorites for contour work. That's why you'll find them so widely used in die-making and contour sawing of all kinds. Perfectly formed teeth, set with absolute evenness on both sides of the blade, insure smooth, accurate results and greater satisfaction

### ... for Horizontal Cutting

In the wider widths, these rugged, long-lasting Hard-Edge Blades are "tops" for use on horizontal machines, cutting off bars, tubing, angle iron, etc. Furnished either Regular Set or Wavy Set to handle the variety of cutting encountered in steel warehouses and general shop work. Hardy new 100' and approximately 300' coil containers insure factory perfect saw blades. Welded-to-length saws also supplied.





### ... for Non-Ferrous Cutting

Simonds Hard-Edge Skip-Tooth Band Saws are especially adapted for use on soft materials such as aluminum, magnesium, plastics, and hardwoods ... provide extra gullet capacity with maximum blade strength... are widely used in brass and aluminum foundries and plastic fabricating plants. Your Simonds Distributor will

supply you with the right blade for your job.

Pactors Drambes in Borne, Chargey San Francisco and Portland, Oregon,
Southern Service Shop in Meridian, Miss. (Somerly J. H. Miner Saw Mfg. Co.).
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.,
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SIMONDS SAW AND STEEL CO. For DEFENSE NEEDS
For CIVILIAN GOODS

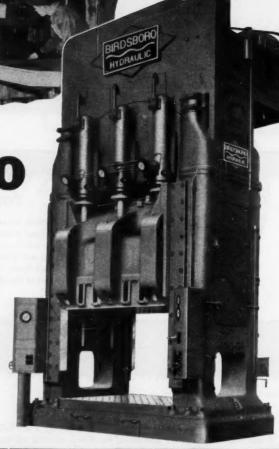
## You Can Count On BIRDSBORO HYDRAULIC PRESSES

#### For HIGH PRODUCTION and SMOOTH OPERATION . . .

Birdsboro design-engineers are ever alert to production trends and are prepared to meet today's urgent demand for greater productive efficiency.

Shown here, at work, are a few of the many examples of Birdsboro's engineering achievements . . . hydraulic presses engaged in the important "double duty" of providing the gigantic requirements of our defense and civilian economy.

If your production problems involve hydraulic means, you can count on Birdsboro engineers to provide the proper solution.



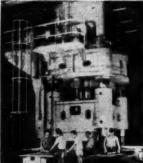




HYDRAULIC

PRESSES





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CP-349	
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MACHINERY, October, 1952-473



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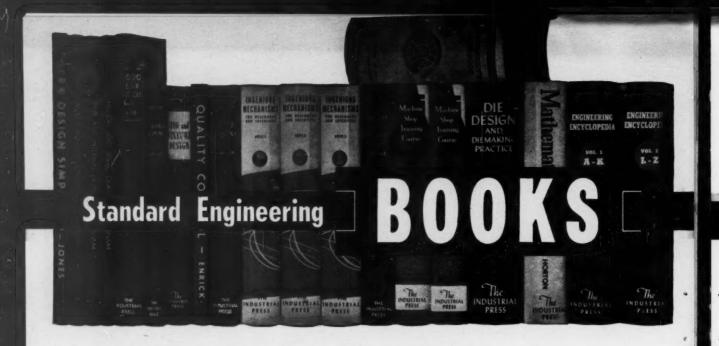
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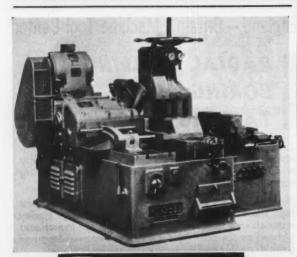


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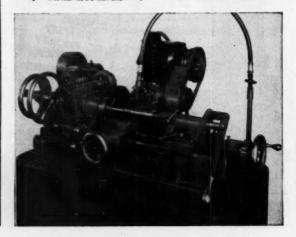


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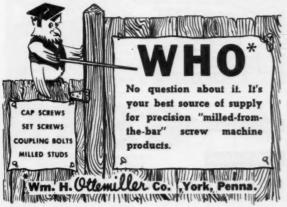
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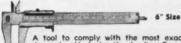
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36"x26"x26" Cross, 2 heads, belt
36"x26"x26" Cross, 2 heads, belt
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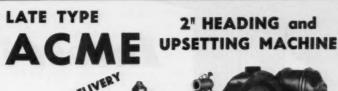
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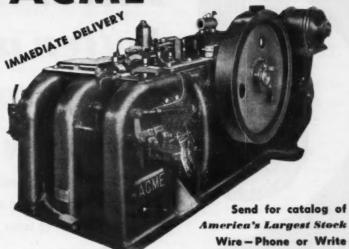
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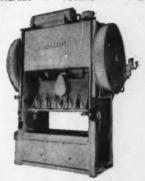
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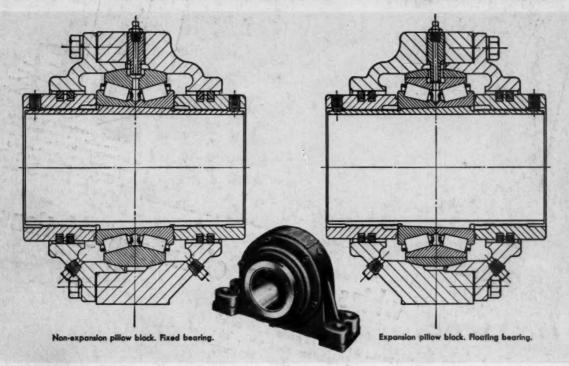
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